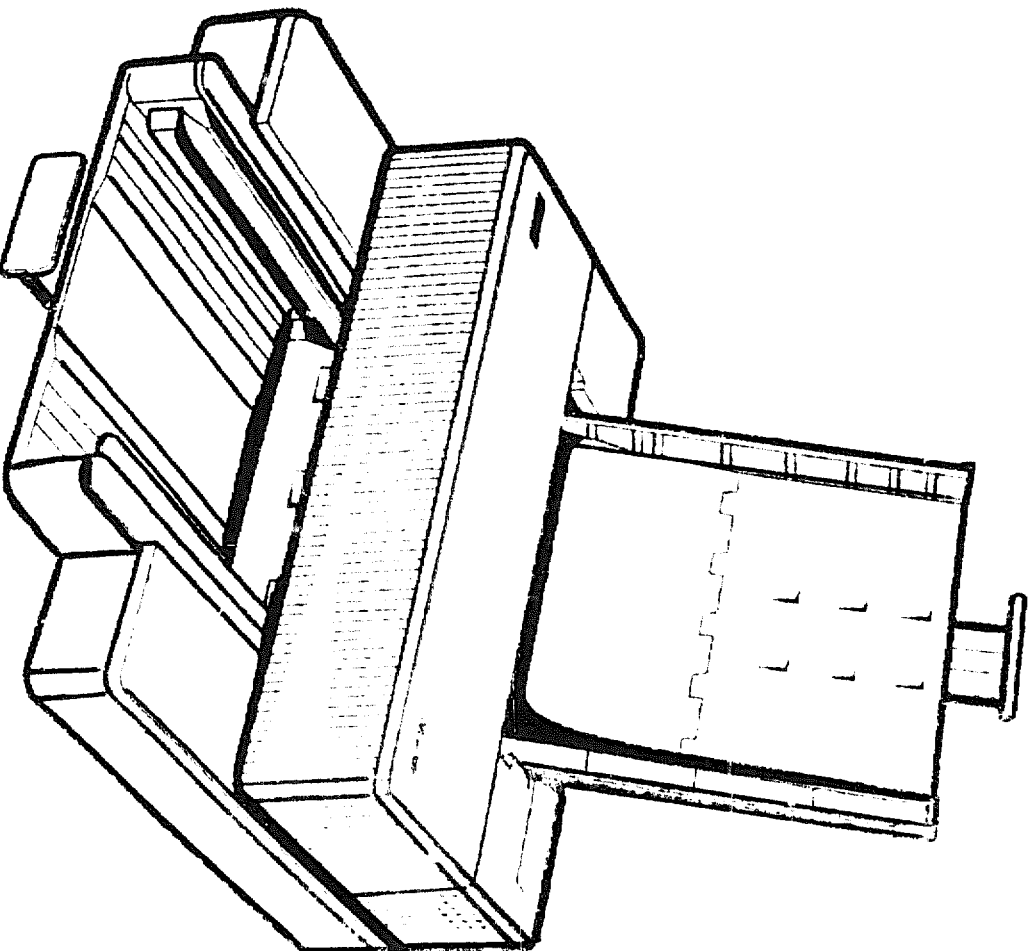


LJ36P DECjet 2000



User Guide



Order Number: EK-LJ36E-UG-001

This guide contains all the information necessary for you, the user, to correctly install, operate, and expand your system. No previous programming experience is required, although a familiarity with computing terminology and concepts is assumed.

FIRST EDITION: September 1991

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Maynard, Massachusetts

U. S. A.

U. S. FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

INFORMATION TO THE USER

NOTE: This equipment has been tested and found to comply with the limits for a CLASS B digital device pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- . Reorient or relocate the receiving antenna.
- . Increase the separation between the equipment and receiver.
- . Connect the equipment into an outlet of a circuit different from that to which the receiver is connected.
- . Consult the dealer or an experienced radio/TV technician for assistance.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Connecting of peripherals requires the use of grounded shielded signal cables.

CANADA

EMI REQUIREMENTS FOR CANADIAN MARKET

This digital equipment does not exceed the CLASS B limits for radio frequency noise from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communication.

SPECIFICATIONS EMI POUR LE MARCHÉ CANADIEN

Ce dispositif digital, s'il est utilisé suivant les instructions et recommandations du constructeur, ne dépasse pas les limites de la CLASSE B pour le bruit des fréquences radio, établies par les Règles sur l'interférence radio du Ministère Canadien des Communications.

Dieses Gerät entspricht den EWG 87/308 und VDE 871 Bestimmungen für Verhütung und Beseitigung von Funkstörungen.

Zusatz für periphere Geräte (z.B. Video):

Dieses Gerät trägt als Nachweis, daß es den Funk- Entstöranforderungen der DBP-Verfügung Nr. 1046/1984 entspricht, das VDE-Funkschutzzeichen. Der Zusatz "0871-B/P" soll in Kurzform ausdrücken, daß es sich um ein peripheres (nicht selbständig betreibbares) Gerät handelt, das nur einzeln den Funk-Entstöranforderungen der Grenzwertklasse B nach DIN VDE 0871/6.78 und der DBP-Verfügung 1046/1984 entspricht.

Wird das Gerät innerhalb einer Anlage zusammen mit anderen Geräten betrieben, so muß bei Inanspruchnahme der "Allgemeinen (Betriebs-) Genehmigung" nach der DBP-Verfügung 1046/1984 die gesamte Anlage der Grenzwertklasse B nach DIN VDE 0871/6.78 sowie den Voraussetzungen nach §2 und den Auflagen nach §3 der DBP-Verfügung 1046/1984 entsprechen.

Dies ist in der Regel nur dann erfüllt, wenn das Gerät in einer Anlage betrieben wird, die typgeprüft und mit dem VDE-Funkschutzzeichen mit dem Zusatz "0871-B" gekennzeichnet ist.

This equipment conforms to the specifications of the EEC Directive 87/308 on the prevention and elimination of radio-frequency disturbances.

Si dichiara che questa apparecchiatura è conforme alle disposizioni della direttiva CEE/87/308 per la prevenzione ed eliminazione dei radiodisturbi (D.M. 13 aprile 1989).

Cet équipement est conforme aux précisions de la norme CEE/87/308 sur la prévention et l'élimination des perturbations radio-électriques.

Este aparato responde a las especificaciones de la norma CEE/87/308 sobre la prevención y eliminación de radiointerferencias.

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Preface

This non-impact printer uses bubble ink jet technology, which gives a print density of 300 dots per inch (dpi) and allows a considerable reduction of operating disturbance. It is designed and constructed for a long working life, guaranteeing reliability and constant quality of both text and high resolution graphics at normal and high printing speeds.

This printer can be connected to most personal computers and host systems (UNIX work stations) with a standard parallel interface. Compatible with the software applications most commonly used with this class of printer (HP DeskJet PLUS - resident; EPSON FX 850 and IBM 4201/02 - optional), it can be used in virtually any working environment. The resident firmware emulates completely the HP DeskJet PLUS printer (extended PCL-III commands and character fonts). Further commands sets and character fonts, which increase and extend the printer's operating range, are available as options from the manufacturer.

The standard and optional (ASF2) paper handling devices allow the use of a wide range of paper, transparency and envelope types and sizes.

Configured in the appropriate operating environment, this printer is the ideal output tool for Word Processing and Desk-Top Publishing applications.

How to Use this Manual

This manual contains all the information required to install the printer, to configure it for a particular operating environment, to run it and to develop applications. It is intended for use by both first-time and experienced users.

The text contains three different types of annotation which should always be read.

***** *This NOTE gives you additional information and hints on the subject in question.*

 ***This CAUTION should catch your attention, advising you of a particular situation and/or problem which may occur and/or be avoided as a result of a certain sequence of operations***

It may also contain a reminder to execute a particular operation.

Ⓢ This **WARNING** indicates a specific procedure which must be strictly observed.

Failure to comply with the instructions given may result in serious damage to the printer.

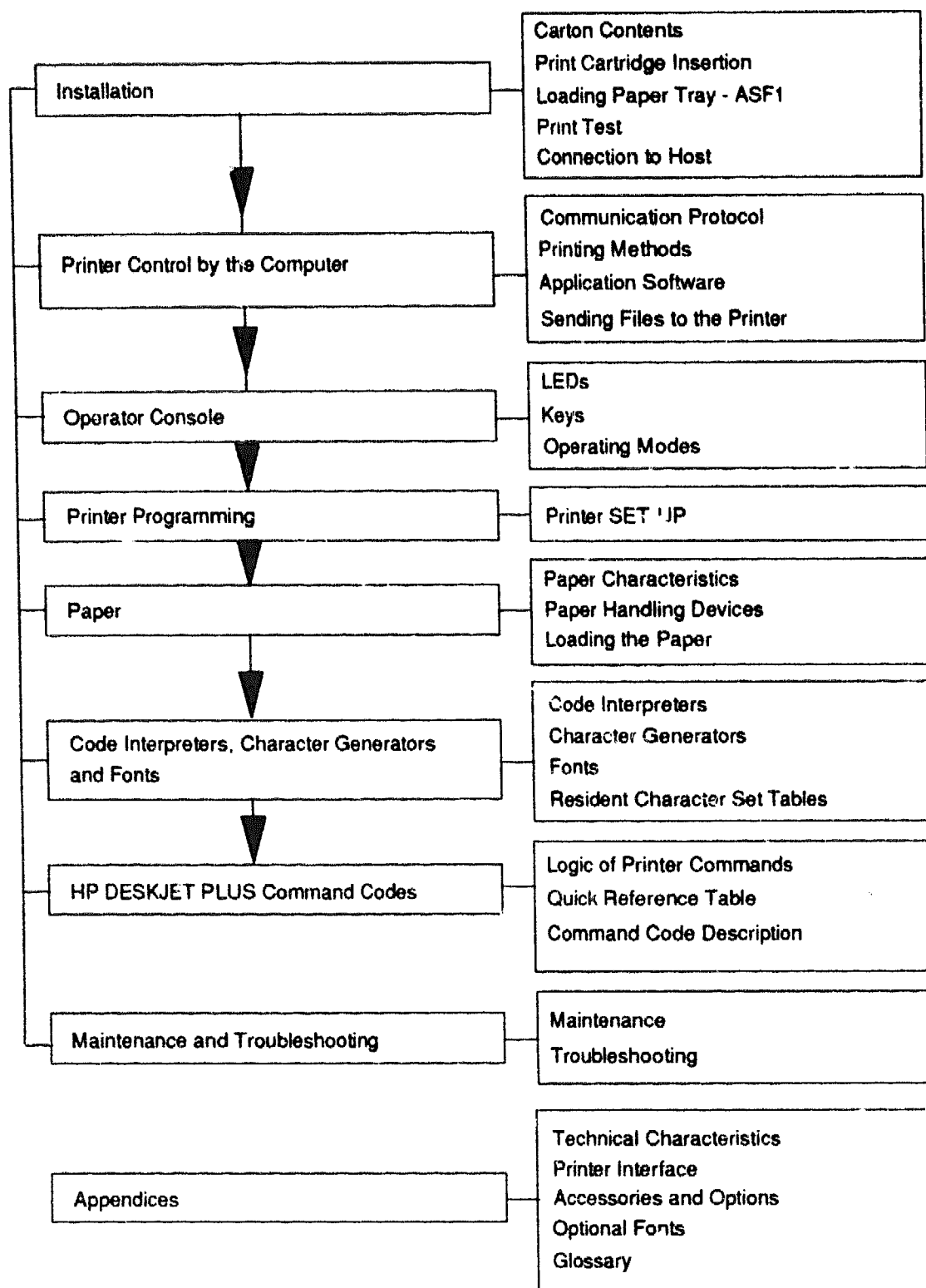
The Structure of the Manual

The manual is structured with a step-by-step approach. Following it chapter by chapter, you will be able to install the printer, prepare it for operation and use it. Always refer to the manual whenever you encounter a problem.

Follow all the instructions carefully: the printer will operate without error, executing perfectly whatever it is required to do.

***** *In the sections regarding the logical connection to the computer or host system, and the installation and use of software, this manual can provide only a general outline with some basic hints. For more detailed information, you must consult the documentation of your operating system and application packages.*

The diagram on the following page illustrates the structure of the manual.



Preface

Pre-installation

 ***Avoid possible harm to you and your system. Observe the simple rules below.***

Safety Procedures

TO AVOID PERSONAL INJURY:

- NEVER power on the system with the top cover removed.
- BEFORE installing an option, read the documentation supplied with it.
- BEFORE removing the top cover from the system module:
 1. Make sure the system is switched OFF before you connect or disconnect a unit. If the unit involved is powered externally, make sure it is switched off as well.
 2. Disconnect the system power cable from the external power supply.
 3. Disconnect the power cables of externally powered peripherals, if any, from their external power supplies.
 4. Disconnect any cables from attached interface connections or peripherals.
- DO NOT open or try to perform any maintenance operations on the system module power supply.
- DO NOT handle the batteries in your system. These lithium batteries should be replaced only by qualified technical personnel. There is danger of explosion if they are replaced incorrectly.
[Note for service personnel: replacement batteries must be the same or equivalent type recommended by the equipment manufacturer. Used batteries must be discarded according to the battery manufacturer's instructions.]
- DO NOT remove the monitor's casing or attempt monitor maintenance as high voltages are enclosed.
- Loosen ONLY those fastenings indicated.

TO AVOID DAMAGE TO YOUR SYSTEM

- Static electrical charges are harmless to people but they can damage sensitive electronic components. To prevent static electrical damage, touch a grounded surface just before taking a board, coprocessor, chip, or other electronic component from its protective packaging or removing it from the system module. For better protection, wear an earthed antistatic wriststrap.

CHAP 1

[illegible]

Installation

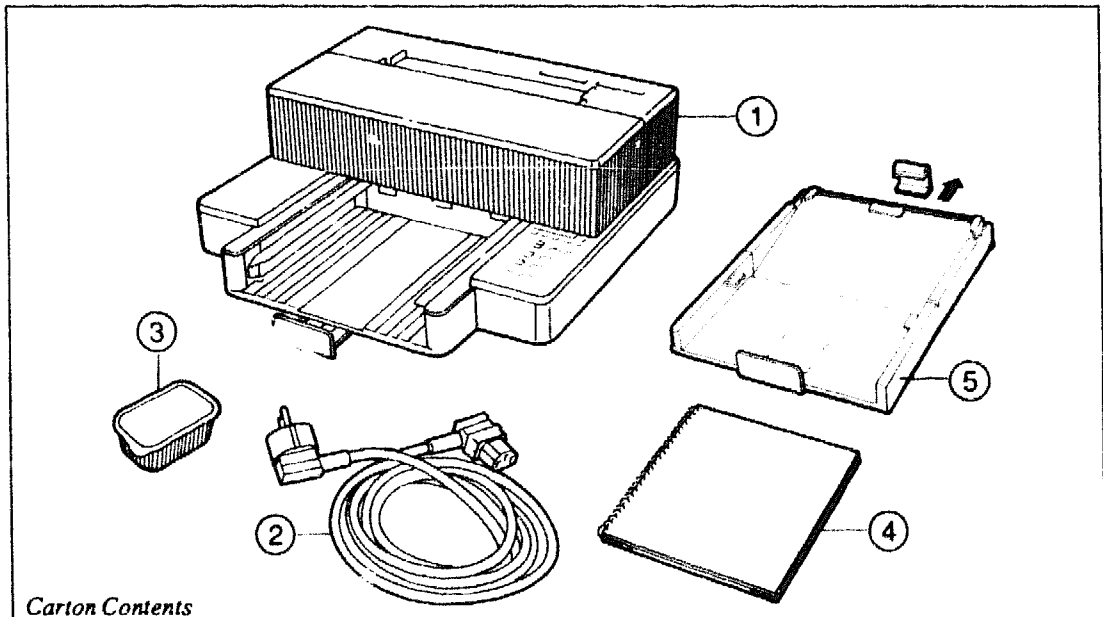
This chapter contains all the information you require to install your printer and obtain a local print test to confirm that it operates correctly. Read it carefully, following the instructions given; the illustrations will help you to locate the printer parts and controls to be used.

Carton Contents

 **Keep the carton and all the packing materials in case the printer is to be relocated or removed for repairs.**

As soon as you have removed the printer and its accessories from the packing carton, check that all the parts ordered have been delivered and are undamaged.

Remove the transport safety device from the rear and the elastic band from the left hand side of the ASF paper tray.



1. Printer
4. User manual

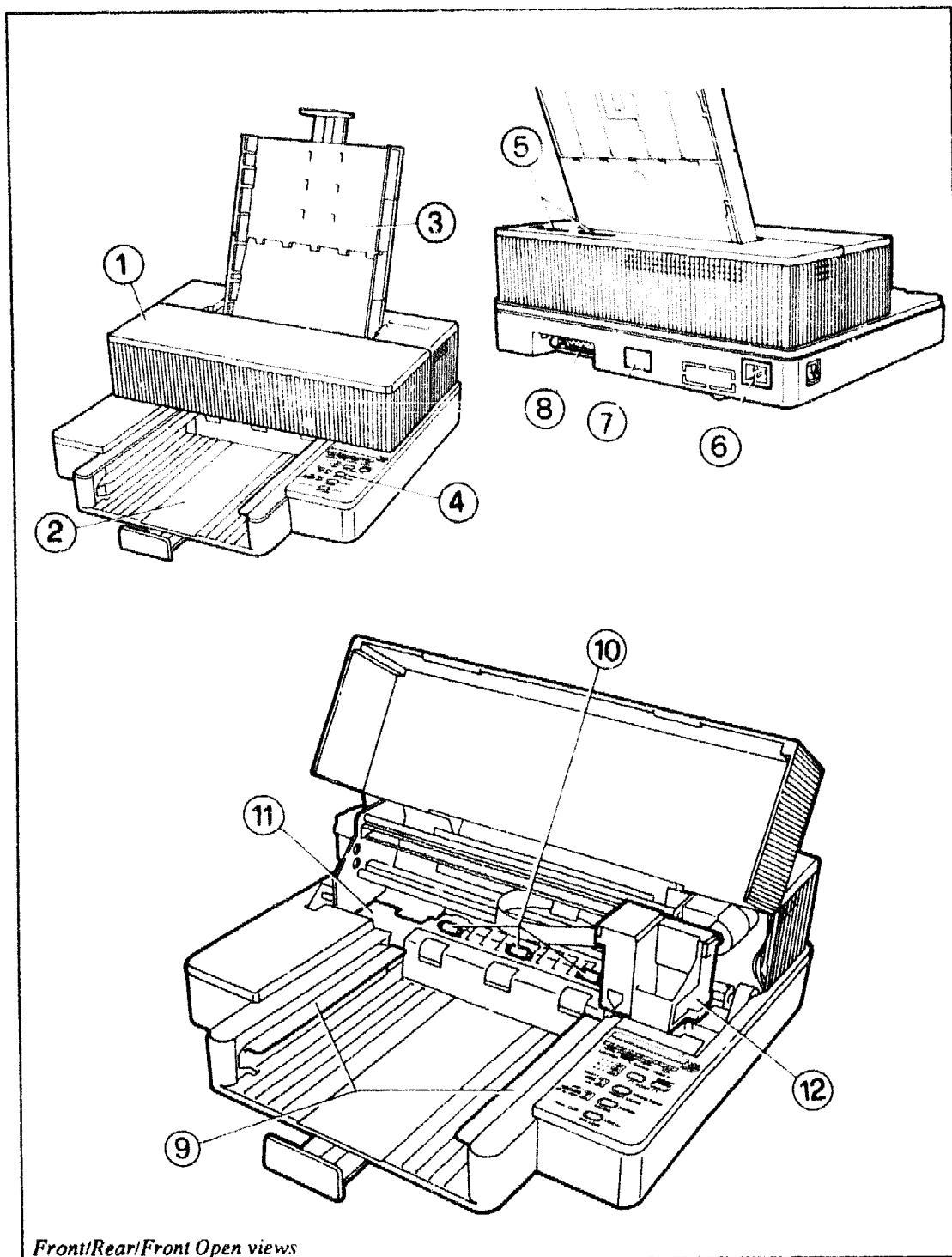
2. Power cable
5. Paper tray (ASF1)

3. Print cartridge

 **IF ANYTHING IS MISSING OR DAMAGED, CALL YOUR DIGITAL SALES REPRESENTATIVE IMMEDIATELY.**

Installation

Printer Presentation



Front/Rear/Front Open views

The figures on the facing page show a front and rear external view and a front internal view of the printer. The following parts are indicated:

1. Top cover
2. Print-out stacker
3. Paper tray - ASF1
4. Operator console

5. Slots for optional memory cards
6. Power cable socket
7. Electrical data plate
8. Parallel interface cable socket

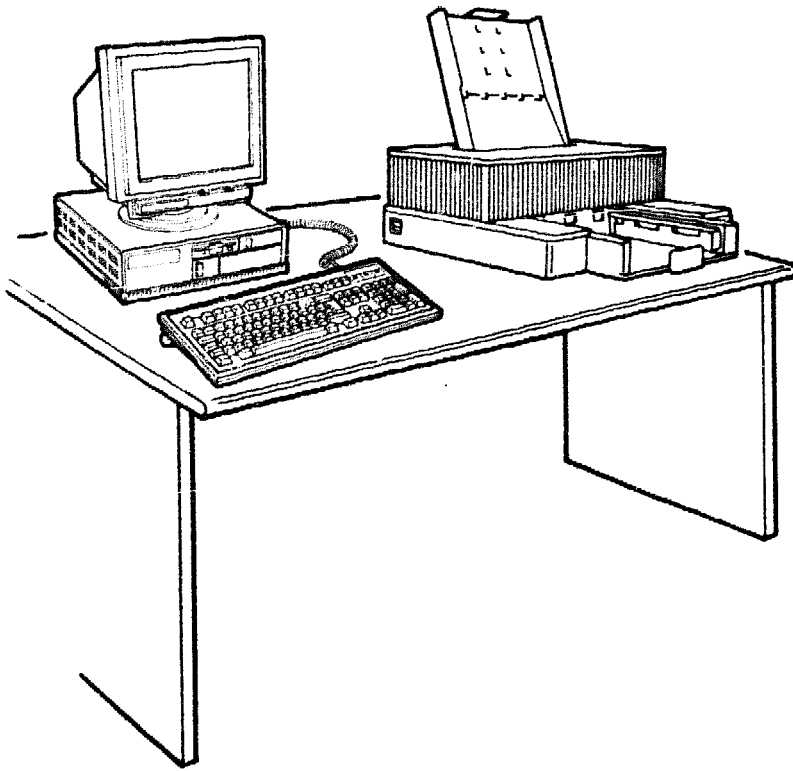
9. Movable stacker guides
10. Paper feed rollers
11. Print contrast bar
12. Print cartridge carriage.

Installation

Printer Location

Place the printer on an ample, flat, stable surface next to your computer or work station.

Ⓒ DO NOT LEAVE THE PRINTER EXPOSED TO DIRECT SUNLIGHT OR HEAT SOURCES, OR IN DUSTY OR DIRTY ENVIRONMENTS.



Printer Location

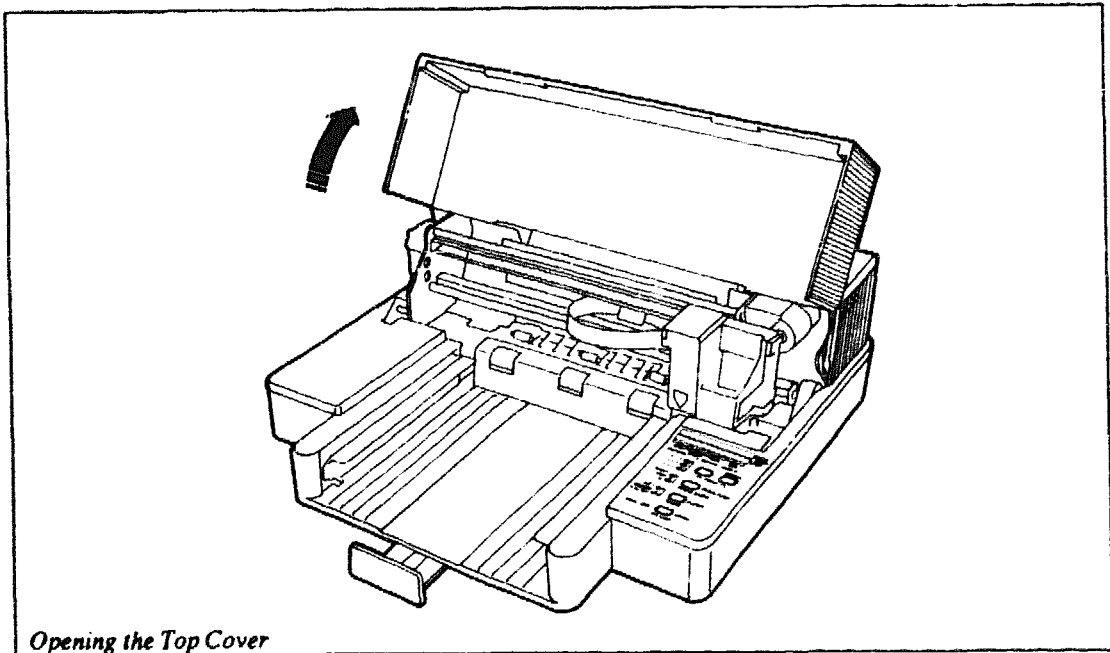
Make sure that there is enough space around the printer for all its parts to be accessed conveniently.

Print Cartridge Insertion

Open the top cover of the printer, to access the print cartridge insertion area.

 *The printer has a "top cover open" sensor which, when the printer is switched on and operating, ensures that the print cartridge carriage stops in its rest position whenever the cover is opened.*

To return the printer to operating status, close the top cover and press the LOCAL key.



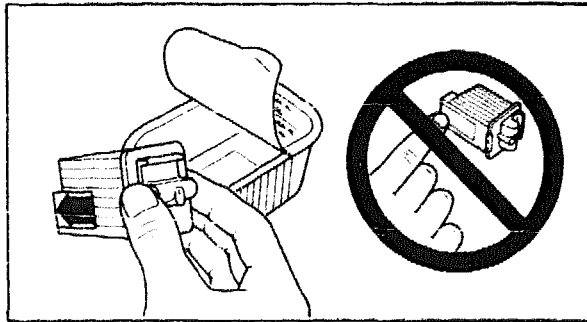
Opening the Top Cover

Installation

Open the sealed print cartridge container and remove the protective cover.

Remove the print cartridge from its container, holding it in the grey area (side opposite the protective film).

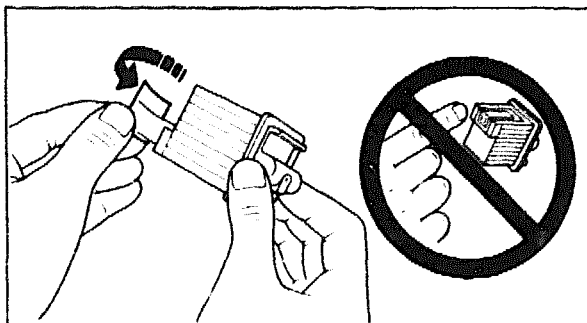
 **Do not touch the electrical contacts or sit the cartridge on them.**



Removing the Print Cartridge from its Container

Still holding the cartridge in the grey area, remove the label and the protective film, in the direction indicated by the arrow.

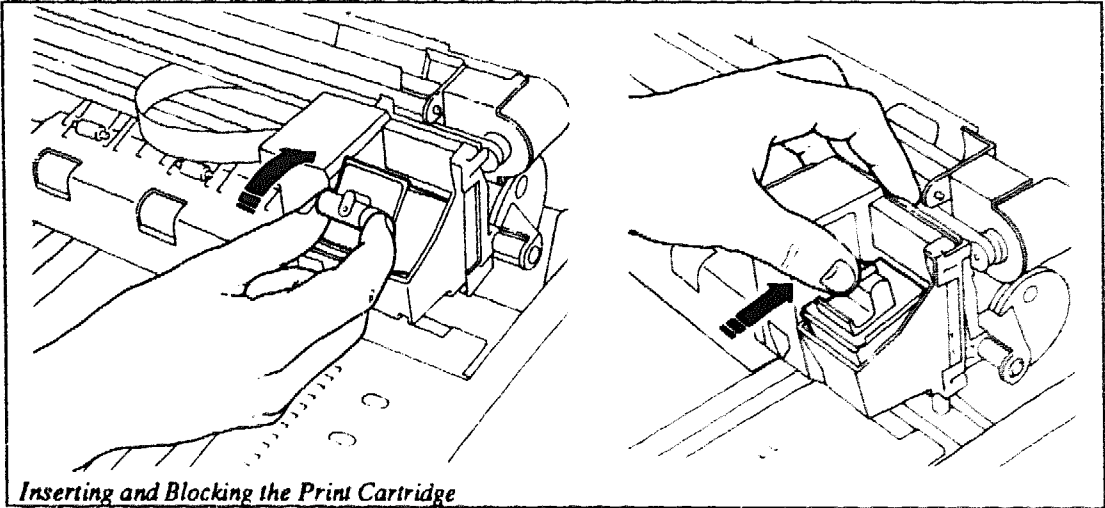
 **Do not touch the printing nozzle or sit the cartridge on it.**



Removing the Protective Film

Installation

Insert the print cartridge in its chamber in the printer, pushing it down and then forwards to fix it in place.



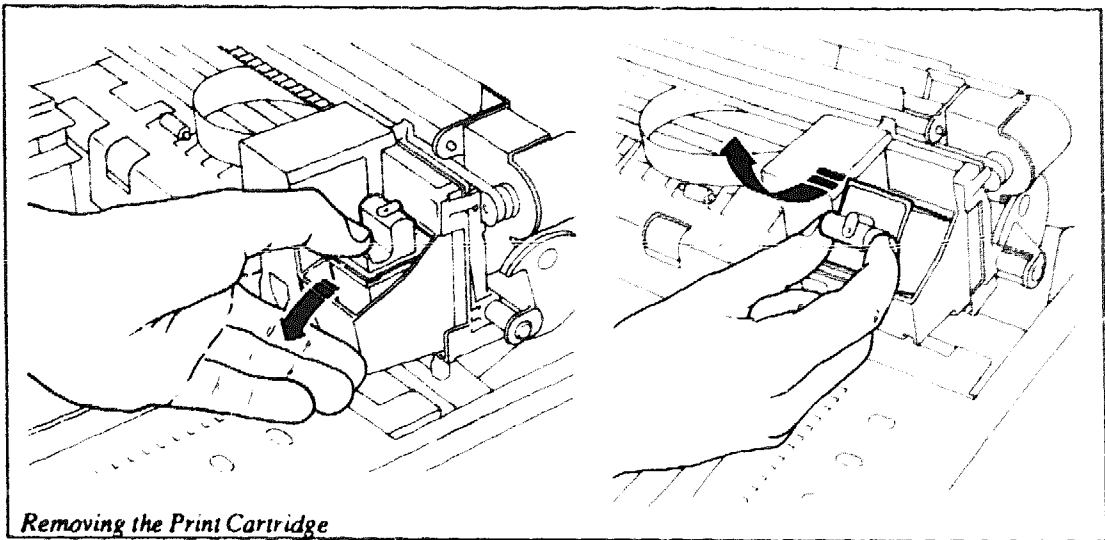
Inserting and Blocking the Print Cartridge

⚠ *Make sure the print cartridge is inserted and fixed correctly. If necessary, repeat the insertion operation.*

Close the top cover.

Print Cartridge Removal

The print cartridge is removed either to replace it, or to repeat its insertion in the case of faulty printing. With the top cover open, push the cartridge towards the operator console and pull it upwards.

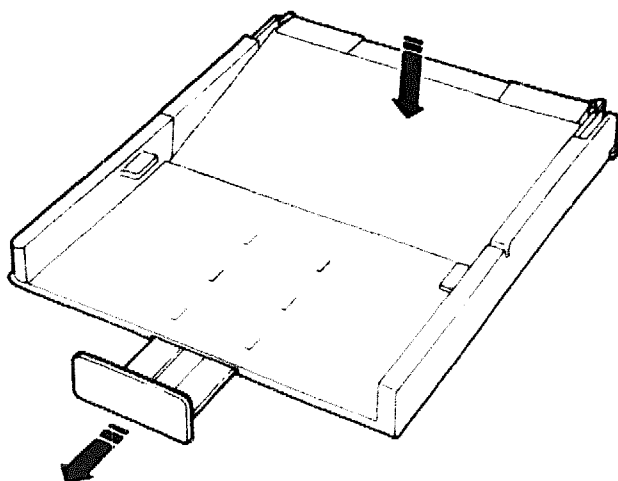


Removing the Print Cartridge

Installation

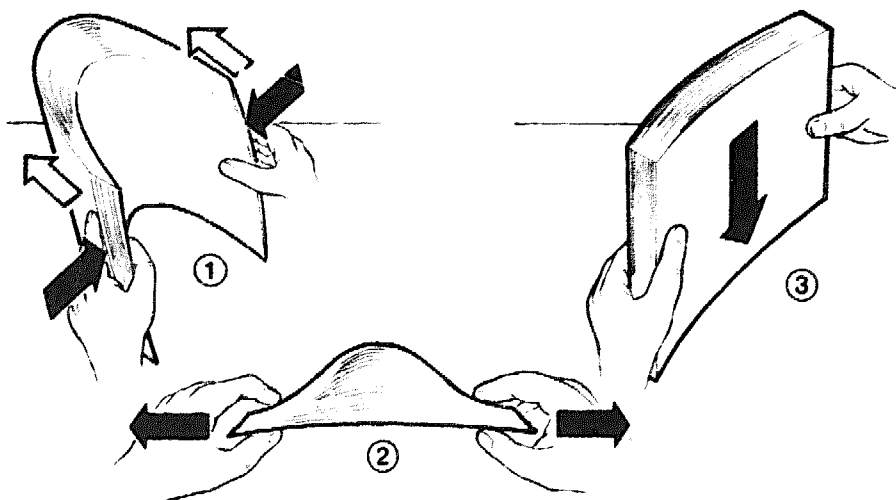
Loading the Paper Tray - ASF1

Pull the upper guide of the tray outwards and push down the paper plate, to simplify the insertion of the pack of paper.



Opening the upper guide

Leaf the paper thoroughly (max. 150 x 80 g/m² sheets).

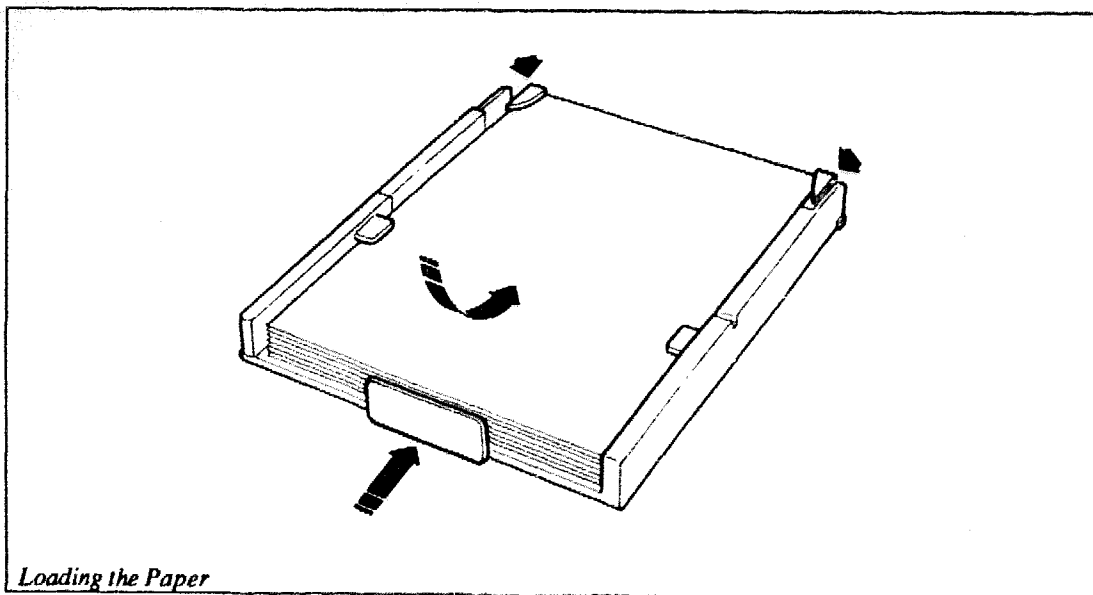


Leafing the Paper

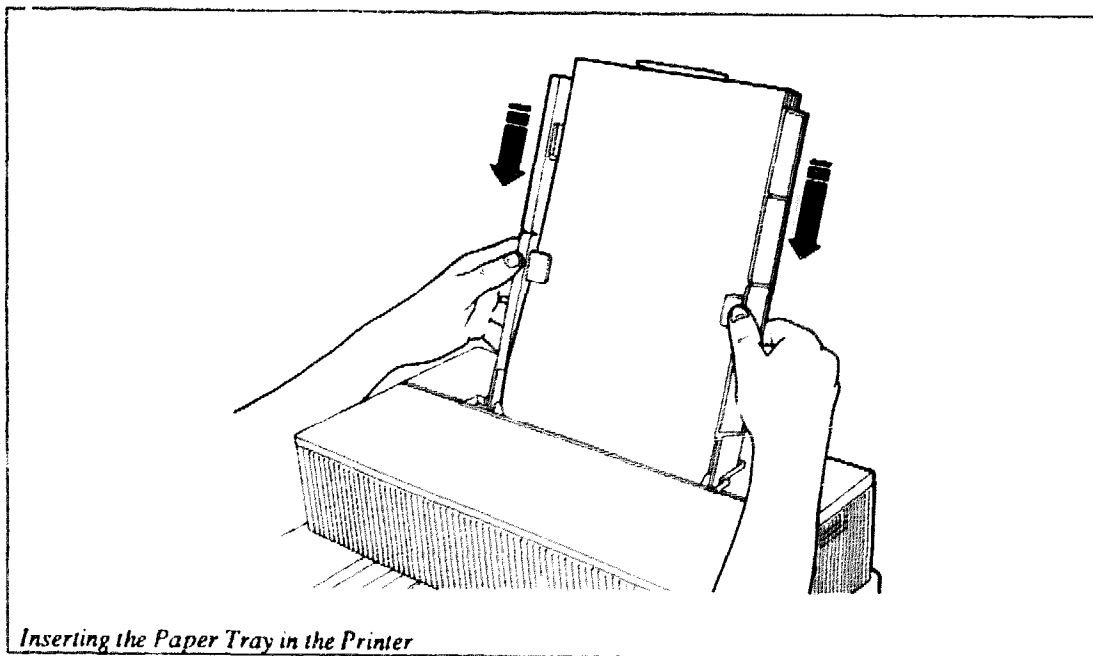
Installation

 **Load the paper face as indicated on the paper packaging.**

Load the paper in the tray, feeding it under the two lateral guides, and position the upper guide against the edge of the pack.



Insert the tray in the opening on the top cover of the printer, pushing it downwards.



Installation

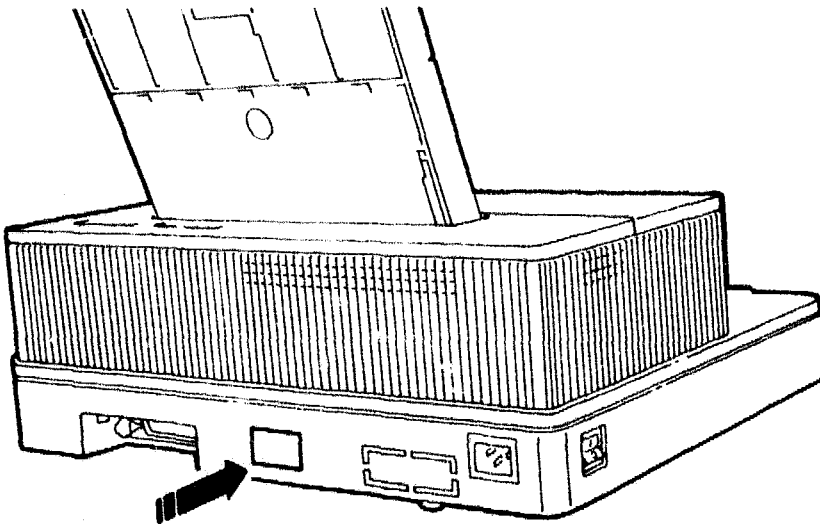
Connection to the Mains Power Supply

BEFORE connecting the printer to the mains supply and/or switching it on, read all the following points carefully.

Make sure the mains power supplies the voltage indicated on the electrical data plate on the rear of the printer.

IF THE POWER SUPPLIED IS NOT THAT INDICATED, CALL YOUR DIGITAL SALES REPRESENTATIVE IMMEDIATELY.

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT AND/OR SWITCH ON THE PRINTER.



Electrical Data Plate

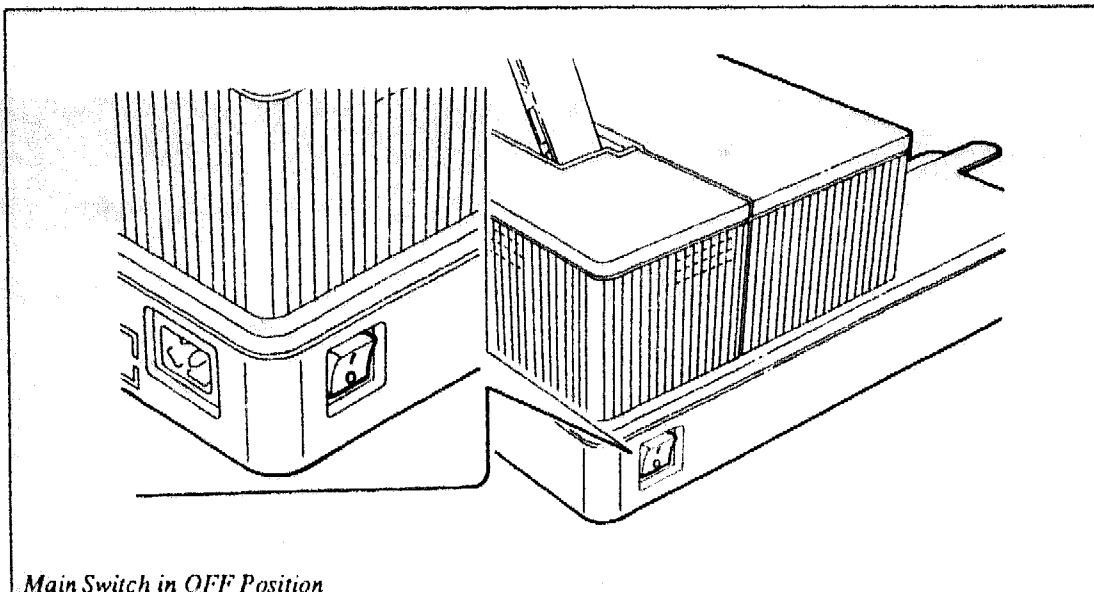
Make sure that the mains power socket you intend to use is earthed. If it is not, have it earthed by a qualified electrician, or relocate your printer so that it is near an earthed socket.

Make sure that the plug on the power cable is of the type accepted by the mains socket you intend to use; if it is not, call your Digital sales representative.

DO NOT ATTEMPT TO CHANGE THE PLUG YOURSELF.

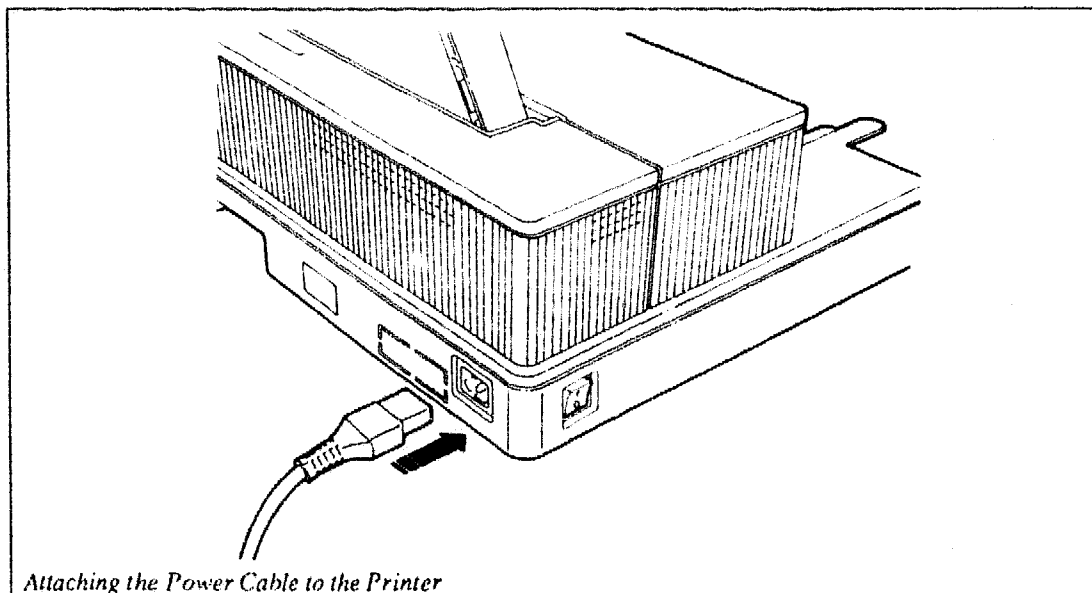
Installation

Make sure the ON/OFF switch on the printer is in its OFF position



Main Switch in OFF Position

ALWAYS attach the power cable to the printer **BEFORE** plugging it into the mains power socket, **NEVER VICEVERSA**.



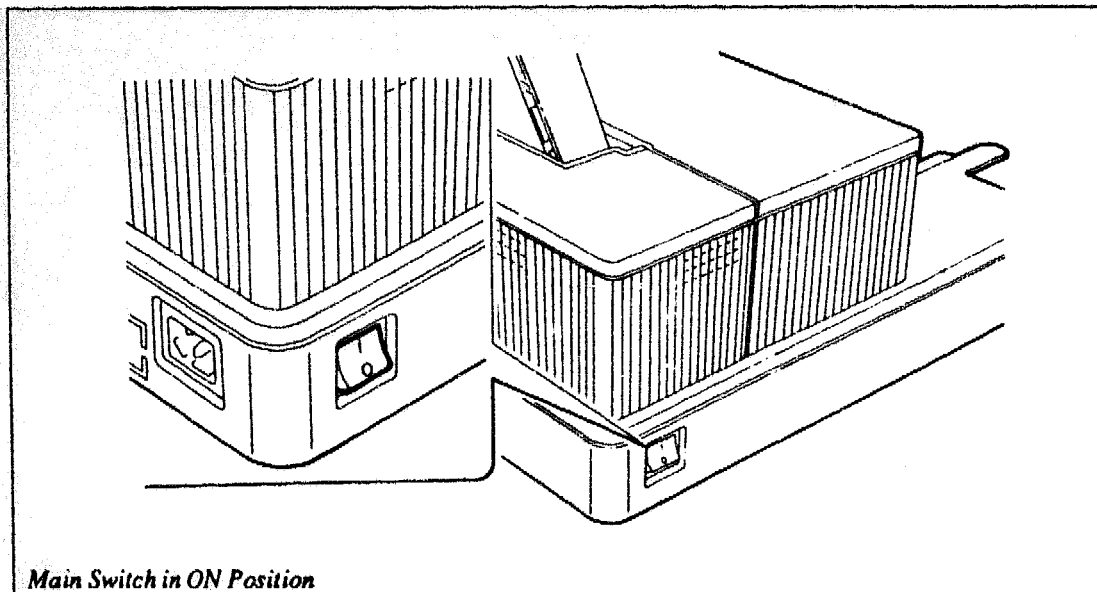
Attaching the Power Cable to the Printer

Ⓢ THE MANUFACTURER ACCEPTS NO RESPONSIBILITY FOR ACCIDENTS OR DAMAGE ARISING FROM THE NON-OBSERVANCE OF THE ABOVE PROCEDURE.

Installation

Printer Switch-On

After checking **ALL** the previous points, and **ONLY** if no further intervention is required, plug into the mains power supply and switch on the printer.



Whenever the printer is switched on:

- it undergoes a series of internal checks.
If any faults are found, all the LEDs on the operator console will flash simultaneously. Should this happen, switch the printer off and then on again. If the fault persists, call your Digital sales representative or Digital services.
- the print cartridge carriage moves to the extreme right-hand position (mechanical reset)
- some of the LEDs on the operator console remain lit.
They indicate the current settings for the corresponding parameters (see Chapter 3 to modify these settings.)

Switch the printer off.

 ***If you have had any problems, check that you have executed all the installation procedures correctly; if so, see Chapter 8 - Maintenance and Troubleshooting.***

You can now run the print test, to check that the printer operates properly.

Print Test

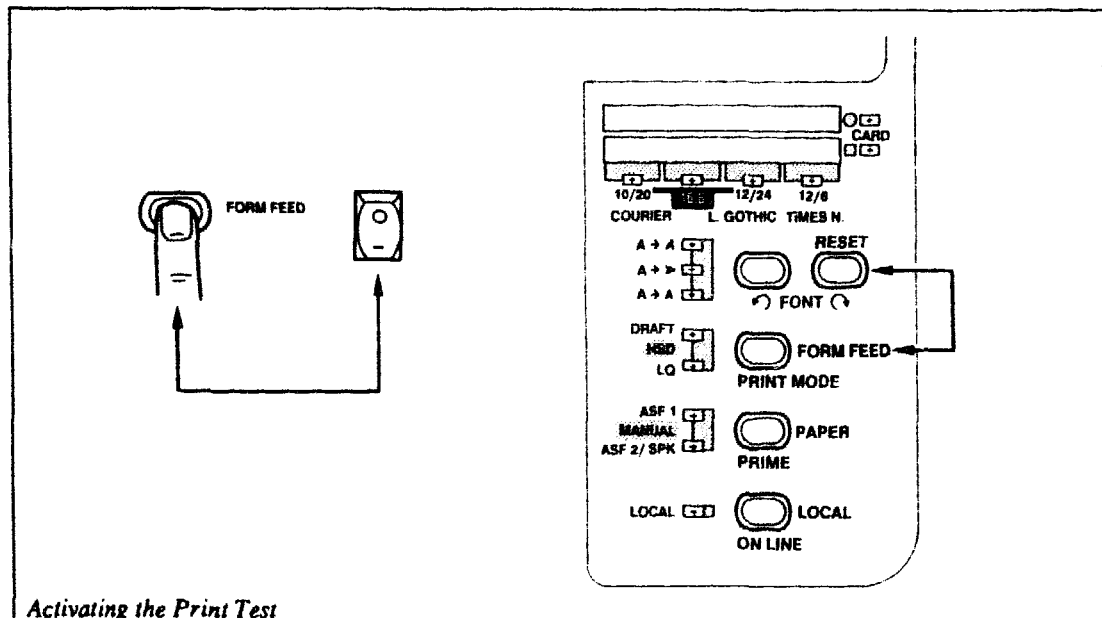
The print text contains concise information on the printer firmware (release, emulation and character generators). In this section, we are going to use it ONLY as a means for checking that the printer actually prints. Here, the various items printed will be explained briefly. Further details will be given in specific chapters.

Running the Print Test

 **Make sure that the print cartridge and the paper tray are inserted correctly.**

Holding down the **FORM FEED** key on the operator console, switch on the printer. (Keep the key held down until the LEDs on the operator console have flashed to indicate access to the print test mode, then release it.)

If the printer is ready, you can run the print test from the LOCAL operating status (see Chapter 3), by pressing the **RESET** and then the **FORM FEED** keys and holding them until all the LEDs have flashed briefly.



Installation

To suspend the print test temporarily, press the **LOCAL** key (pressing this key a second time will cause printing of the print test to resume). With the print test suspended, the **PAPER**, **FORM FEED** and **RESET** keys execute their standard LOCAL operating status functions (see specific section in Chapter 3 - Operator Console).

To truncate the print test, either switch the printer off, or press the **LOCAL** key (LOCAL LED lights) and then the **RESET** key.

The print test fills at least three pages (more, if optional FONTs have been loaded). Once the test is completed, the printer will be ready to operate.

Check the print quality of the test, making sure that all the characters are clearly defined and complete.

 *If you have had any problems, check that you have executed all the operating procedures correctly; if so, see Chapter 8 - Maintenance and Troubleshooting.*

The following figures contain examples of the print test.

HP DJ+ EMULATION

R. 0.01A

Nozzles test Pass

Internal	COURIER	10	12
----------	---------	----	----

[illegible]

Internal	COURIER	16.67	12
----------	---------	-------	----

[illegible]

Internal	COURIER	20	12
----------	---------	----	----

[illegible]

Internal	COURIER ITALIC	10	12
----------	----------------	----	----

[illegible]

Internal	COURIER ITALIC	20	12
----------	----------------	----	----

[illegible]

Internal	LETTER GOTHIC	12	12
----------	---------------	----	----

[illegible]

Internal	LETTER GOTHIC	16.67	9.5
----------	---------------	-------	-----

[illegible]

Internal	LETTER GOTHIC	24	12
----------	---------------	----	----

[illegible]

Internal	LETTER GOTHIC	13.34	9.5
----------	---------------	-------	-----

[illegible]

Internal	GOTHIC ITALIC	12	12
----------	---------------	----	----

[illegible]

Print Test (1)

Installation

Internal GOTHIC ITALIC 24 12

Internal TMS NORDIC PS 12

Internal TMS NORDIC PS 6

Internal TMS NORDIC ITAL. PS 12

Internal TMS NORDIC ITAL. PS 6

Internal TMS NORDIC ITAL. PS 6

Internal TMS NORDIC ITAL. PS 6

Internal TMS NORDIC ITAL. PS 6

Internal TMS NORDIC ITAL. PS 6

LINE DRAW 12 12

Internal HIGH SPEED DRAFT 10 12

Internal HIGH SPEED DRAFT 16.67 12

Internal HIGH SPEED DRAFT 20 12

Internal HIGH SPEED DRAFT 20 12

Internal HIGH SPEED DRAFT 20 12

Internal HIGH SPEED DRAFT 20 12

Internal HIGH SPEED DRAFT 20 12

Internal HIGH SPEED DRAFT 20 12

Print Test (2)

```
Internal
COURIER
20      12
@@@+@-@#@9|)m+:H$=^~+L#v i "
#$%'(')*+,./0123456789:;<=?@ABCD
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdef
ghijklmnopqrstuvwxyz{|}~ª«»ääåæç
èéëìíîêëöüÿÜ÷½¾¿ÀÁÂÃÄÅÆÇÈÉÊË
ÌÍÎÏÐÑÒÓÔÕÖ×ØÙÚÛÜÝÞßàáâãäåæçèéêë
ñn².
```

Internal
COURIER
16.67 12

Internal
COURIER
10 12

Print Test (3)

Installation

Print Test Contents

Let us now have a quick look at what has been printed.

- the first line of the print test contains information on the printer status:

R. n.nnX

The firmware release (R.): the first figure (n) identifies the release; the next two figures (nn) indicate the level of revision, the final letter (X) indicates the printer version.

- the second line of print test allows you to check whether any dots are missing (blocked nozzles); any faulty nozzles will be indicated on the third line, as follows:

A NOZZLE TEST PASS and uninterrupted diagonal line: no faulty nozzles

B NOZZLE TEST PASS and incomplete diagonal line: faulty nozzle(s) due to air bubble(s) which prevent emission of ink bubble(s).

In this case, with printer in "FREE" condition (see Chapter 3 - Operator Console), press the **PRIME** key for a few seconds to clear the print head.

C NOZZLE TEST FAIL nn: electrical connection of nozzle "nn" interrupted.

In this case, repeat the print cartridge insertion procedure (see specific section in this chapter).

- If the optional 256K byte RAM Card is already inserted, the auxiliary memory capacity will be indicated.
- The rest of the print test contains a print-out of the resident (or optional) fonts in Portrait and/or Landscape mode(s).

Once you have checked that your printer prints correctly, connect it to your personal computer or host system.

Connection to a Host System

Your printer is connected to a host system (personal computer, minicomputer, etc.) by means of an interface cable (see the list of recommended parallel interface cables in Appendix C).

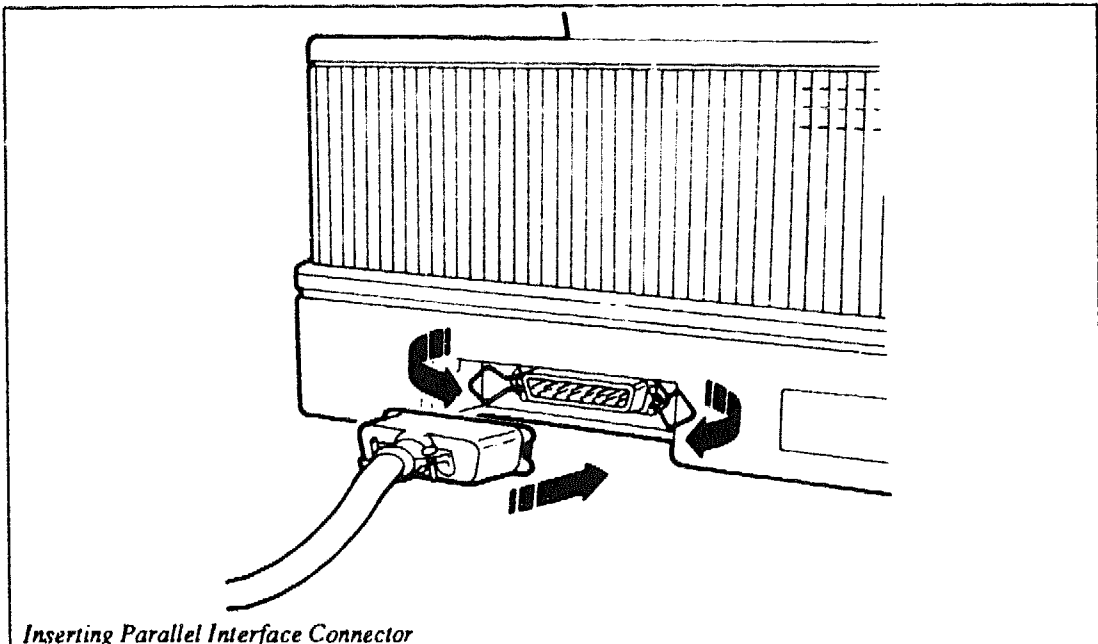
This printer has a parallel, Centronics-like interface.

Connecting the Parallel Interface Cable

Switch the printer off.

Plug the interface cable connector into the appropriate socket at the rear of the printer, and close the spring clips on either side to hold it in place.

Switch the printer on.



Inserting Parallel Interface Connector

For data transmission from and printer handling by the host system, see the next chapter - Printer Control by the Computer.

☞ If you have had any problems installing the printer, check that you have executed all the procedures correctly; if so, see Chapter 8 - Maintenance and Troubleshooting.

Printer Control by the Computer

This chapter gives you some useful information regarding the interfacing between the printer and your system and applications. Experienced users will be familiar with most of this information, but new users should read it carefully, as it may clarify some of the problems they encounter initially and give a deeper insight into some features of the printer SET-UP as well as to the software installation process.

The Communication Protocol

One of the most crucial things which affects the correct working of your printer and computer is the setting of the communication protocol. If the protocols do not match, you will not obtain satisfactory results or even none at all.

It is not difficult to set the protocols correctly, but it is **ABSOLUTELY NECESSARY** THAT THE COMMUNICATION PARAMETERS IN THE PRINTER AND IN THE COMPUTER BE COMPATIBLE.

 *The information given in this chapter refers to an MS-DOS environment as this is the most widely-used one. For other environments the same logic remains true, but see the related documentation for details.*

The indications given here are sufficient for the MS-DOS releases up to rel. 3.2. For MS-DOS rel. 3.3 onwards, see the related documentation for additional information about correct installation of your printer in the `config.sys` file, etc.

With the parallel interface, you do not have to do anything, as the only variable parameter is the data format "word length", which, in the PC, is always set to 8. This is the printer's default setting.

The parallel communication protocol can be activated using the following MS-DOS command (consult your MS-DOS manual for the complete syntax):

```
MODE LPT1: (characters per line), (line-pacing), P
```

To address the parallel printer interface as a logical output device, you can use one of the following names: LPT1 or PRN.

Printer Control by the Computer

Printing Methods

Once your printer and computer are connected correctly and the logical link established, you can use the printer to its full extent. You already ran the print test when you installed the printer and saw the printer execute an internally-commanded operation. You can now have the printer print something on your command. The following section contains some basic operations, which do not require the processing of an application.

 *For all following operations make sure the printer is switched on, with paper and print cartridge loaded, and that it is ON-LINE.*

Printing a Text Screen

The easiest way to obtain a print-out is a screen dump. Let us presume you are in your operating system and have made a Directory Listing with the command **DIR**. If you want this list printed out for future reference, simply press **SCR PRT** on your PC keyboard (on some PCs, **SHIFT** is also required simultaneously). The printer will start to print everything you see on the screen exactly as you see it. You regain the control of your keyboard when the necessary data transmission to the printer is finished.

***** *This method works from within all applications which handle the screen in text mode (certain types of graphics may not be printed).*

Printing Text Files

The most common printer operation is the printing of a complete text or data file. When you have printable files, prepared by your editor, word processor, database etc., you can send them to print using one of the following methods.

***** *A printable file is one which contains only the data to print and probably appropriate printer control commands and is basically line oriented (closes each printable line with CR/LF). Printing with applications is explained in a specific section in this chapter.*

Printer Control by the Computer

When you have the system prompt, type one of the following commands:

print {filename} This invokes the print utility of your operating system. The first time you call it, it will ask you to confirm or change the output port. For details about file spooling etc., see in your DOS Manual.

 *This command executes a Form Feed automatically after each document is printed.*

type {filename} > prn This utility normally lists the contents of a file on your screen, but in this case redirects it to the printer, allowing you to interrupt printing with **CTRL - C**, as you would do for the screen. This command will execute an automatic Form Feed at the end of a document only if it is included in the document itself.

copy {filename}/B > prn This command also sends the file to the printer. If you send graphic or DLL (i.e fonts) files to the printer, remember use the optional **"/B"** parameter in the command to override any End Of File (=EOF =26D) command, which otherwise would cause DOS to discontinue the data transfer.

***** *For more detailed information about these commands, consult your MS-DOS manual.*

Printer Control by the Computer

Application Software

The printer features (graphics, FONTS, etc.) are activated using the appropriate command codes. Before you can use a particular application (word processor, spread sheet, data base, graphics program, etc.) on the printer, the software package will request the type of printer used. This part of the application is known as the "driver".

Most packages can be installed on a wide variety of printers. The printer selection procedure will vary depending on the type of application package to be installed. The correct use of this printer requires that your application package contains the Olivetti JP 150 or JP 350 driver. If this driver is not available, choose the HP DESKJET PLUS or DESKJET driver or the LASERJET driver.

 ***DESKJET does not exploit to the full all the features of this printer.***

LASERJET may cause incorrect printing of graphics programs.

If none of the above drivers is available, this printer will operate with an IBM Proprinter 4201/02 or EPSON FX 850 driver, providing the corresponding optional emulation memory card has been inserted.

***** *To check that all the features you require are programmed and operating correctly, you can run a print test before switching to your normal working procedure.*

Some software will ask you to define a communication port for your printing output. If you are working with a PC, choose "LPT1:", for the parallel interface.

Printer Control by the Computer

Sending Files to the Printer

When you want to print from a word processor, spread sheet, database, graphic package or other application, always use the built-in print function they offer.

Do not attempt to send one of the package's work files directly to the printer, as they rarely have a format which can be executed directly by the printer. The only exception are line oriented editors.

If you need to print documents independent of the application package, use the function "print to a file", which some (but not all!) packages offer. The data written to this file is then exactly like the output otherwise sent to the printer. You can now send these files to print from the operating system level with the commands described already in the section "Printing Text Files".

Some Hints on Printing

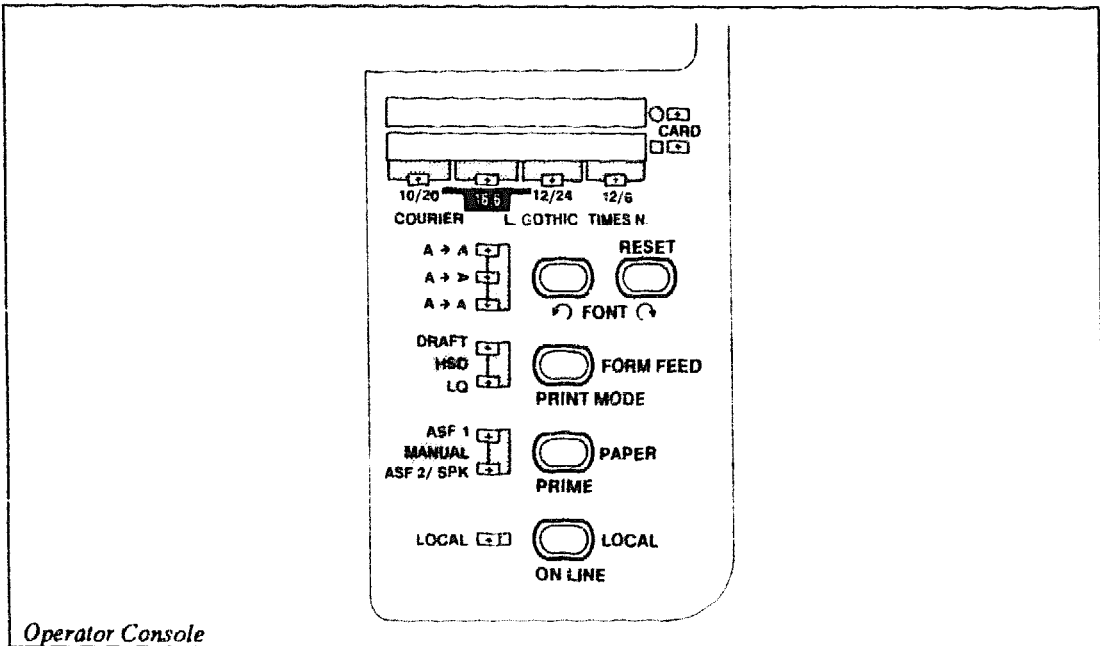
When using an application package, the package itself often takes care of the correct setting of the page layout parameters, overriding those defined in SET-UP. Some packages, however, do not, so when using them, check that all the selectable parameters are compatible, and bear in mind the following:

1. If your printer has a physical TOF and BOF margin, make sure your form length definition falls **WITHIN** these pre-set margins. If not, you may encounter the situation where the printer executes an automatic form feed when printing arrives at the bottom margin and the software executes another one just after the start of the next page.
2. When defining the line length for your print output, make sure the left margin plus the line of text do not exceed physical line length. The amount of printable characters per line varies, as it depends on the letter size and spacing, but when the print head reaches its rightmost position and there are some characters left, the printer may either ignore the excess characters or automatically print them on the following line. This can destroy your text layout.

Operator Console

Operator Console

The operator console allows you to control the basic printer functions and also to execute certain special operations using its keys. The console has five keys and 14 LEDs (light-emitting diodes), which indicate the printer's status.



Operator Console

At printer switch-on, all the LEDs light briefly. Some of the LEDs will then remain lit: they indicate the current settings for certain features.

⚠ If no LEDs are lit, this probably means that the printer is not powered. If it is, see Chapter 8 - Maintenance and Troubleshooting - for the identification and/or correction of the fault.

Operator Console

LEDs

When the printer is powered, the LEDs on the operator console are lit according to the current settings. The settings may vary from time to time, if you change them using either of the printer SET-UP modes or with a command code from line.

The first nine LEDs indicate the current font selection; they are organized in three groups:

- Font on optional Font Card:
 - CARD ●
 - CARD ■
- Font typeface:
 - 10 / 20 Courier
 - 16.6 Courier / Letter Gothic
 - 12 / 24 Letter Gothic
 - 12 / 6 Times Nordic

Above these four LEDs and to the left of the two CARD LEDs, there are two areas in which you can insert the template(s), supplied with the optional FONT CARD(S), which indicate the corresponding typefaces available.

- Print attributes:
 - A --> A (Italic)
 - A --> ► (Landscape)
 - A --> Λ (Compressed)

When they are lit, these nine LEDs indicate:

CARD ● an optional font in the card inserted in SLOT ● is selected.

CARD ■ an optional font in the card inserted in SLOT ■ is selected.

10 / 20
COURIER the resident Courier font (or the corresponding font on an optional card) is selected.

16.6 COURIER/ LETTER GOTHIC	the condensed (16.6 cpi) resident Courier or Letter Gothic font (depending on which of the respective LEDs is also lit) (or the corresponding font on an optional card) is selected.
12 / 24 LETTER GOTHIC	the resident Letter Gothic font (or the corresponding font on an optional card) is selected.
6 / 12 TIMES NORDIC	the resident Times Nordic font (or the corresponding font on an optional card) is selected.
A --> A	the font indicated by the lit LED in the previous group will be printed in italics.
A --> ►	the font indicated by the lit LED in the previous group will be printed in Landscape mode.
A --> A	the font indicated by the lit LED in the previous group will be printed in half its nominal width (fixed pitch fonts) or half its nominal height (proportional character size fonts).

The remaining five LEDs (when lit) indicate the following:

DRAFT	DRAFT print mode is selected.
LQ	LETTER QUALITY print mode is selected.

 *If both these LEDs are lit, HIGH SPEED DRAFT (HSD) mode is selected.*

ASF1	the standard paper tray is selected.
ASF2/SPK	the optional ASF2 paper feed device is selected.

 *If both these LEDs are lit, manual paper feed is selected.*

LOCAL	the printer is in LOCAL (OFF LINE) operating status.
-------	--

Operator Console

Keys

The key functions depend on the printer operating status.

You can set the printer in any one of the following operating conditions:

- **ON-LINE (LOCAL LED off).**
The printer is under host system control.
- **LOCAL (LOCAL LED on or flashing).**
The printer is not controlled by the host system; operator intervention is required to execute a specific function or to return the printer ON-LINE.
- **SHIFT (accessed from LOCAL operating status).**
The keys command a second series of auxiliary functions.
- **SET-UP.**
The printer programming environment (see Chapter 4).

One of the following two states will always be present in the above printer conditions.

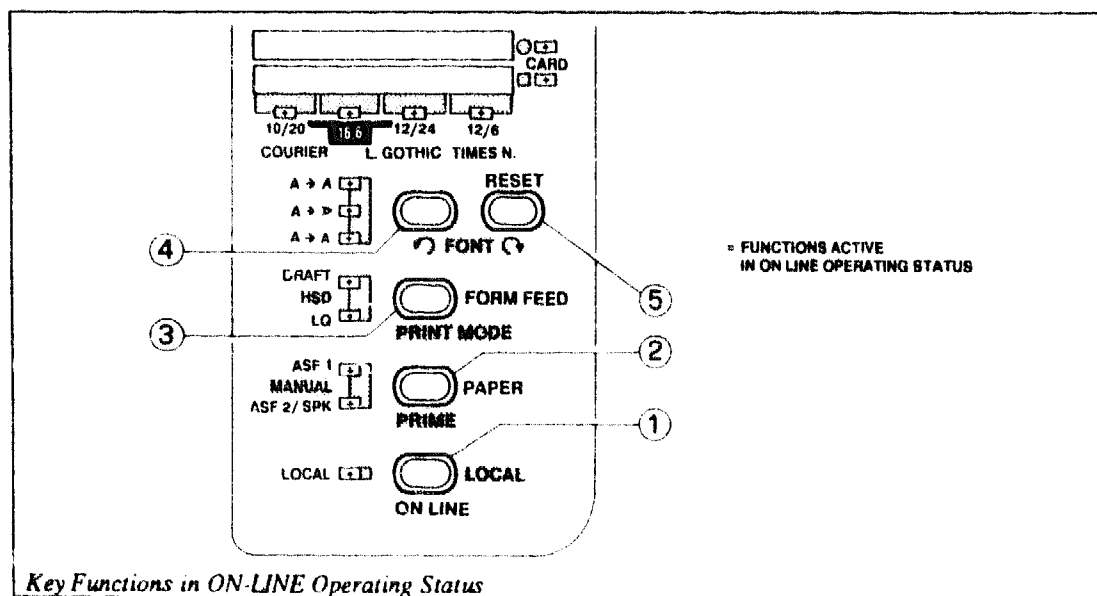
- FREE :** when there is no data to be printed (DRAFT and/or LQ LEDs on and steady).
- BUSY :** from the reception of data until the completion of its printing (DRAFT and/or LQ LEDs flashing).

The following sections describe the key names and corresponding functions in the various printer operating states. The console label shows only the key names for the ON-LINE and LOCAL operating states (identified by colour code). For the key names in SHIFT operating status, see the Quick Reference Guide included with this manual. For SET-UP operating mode, the key names are printed out automatically when you access this environment (see Chapter 4 - Printer Programming).

ON-LINE Operating Status

When you switch the printer on, it will be ON-LINE operating status, *provided that the print cartridge and paper are present.*

In ON-LINE operating status, the printer is controlled by the host system to which it is connected, interpreting the commands and printing the data received from it. You can set the printer in LOCAL operating status (OFF-LINE) by pressing **LOCAL**



The keys execute the following functions:

Key No.	Key Function	Description of Function
1	LOCAL	Changes the printer operating status to LOCAL.
2	PRIME	If the printer is FREE *, executes the PRIME operation (see specific section in this chapter).
3	PRINT MODE	Selects the print mode (see specific section in this chapter).
4	FONT ←	If the printer is FREE *, selects the font sequentially prior to that currently selected.
5	FONT →	If the printer is FREE *, selects the font sequentially following that currently selected.

* DRAFT and/or LQ LED(s) lit and steady.

Operator Console

PRIME

The PRIME function helps clear the print cartridge nozzles of air bubbles which block the emission of ink.

This operation should be done whenever the print quality deteriorates (incomplete character matrix). It is activated by pressing and holding down **PRIME** for at least 5 seconds.

The PRIME operation *cannot* be activated if the printer is BUSY.

 **Do NOT switch off the printer while executing the PRIME operation; such action may give raise to printer malfunctioning. If, for any reason, the power supply is interrupted, the PRIME operation must be repeated, as soon as power is restored.**

Print Mode

Using **PRINT MODE**, you can alter the PRINT MODE settings. When you press this key, the LED(s) indicating the print mode currently selected go(es) off and that (those) indicating the next in the selection sequence light. Selection is cyclic: if the LEDs indicate the last mode in the sequence, pressing **PRINT MODE** will select the first.

The resident emulation allows the selection of one of the following three print modes:

LED \ PRINT MODE			
	DRAFT	LETTER QUALITY	HSD
DRAFT			
LQ			

 = LED lit

 = LED off

 **High Speed Draft (HSD) causes printing with a specific HSD FONT: upright; 12 pt; 5 / 10 / 16.5 / 20 cpi; portrait (printing across the width of the page).**

DRAFT and LETTER QUALITY (LQ) mode are available in all the FONTS (resident and optional on font cards).

Operator Console

Font Selection

The resident emulation allows the selection of any one of the 18 combinations illustrated in the following table.

LED FONT	10 / 20 COURIER	16.6	12 / 24 LETTER GOTHIC	12 / 6 TIMES NORDIC	A > A	A > A	A > A
COURIER 10	☒	☐	☐	☐	☐	☐	☐
COURIER 16.6	☒	☒	☐	☐	☐	☐	☐
COURIER 20	☒	☐	☐	☐	☐	☐	☒
COURIER 10 ITALIC	☒	☐	☐	☐	☒	☐	☐
COURIER 20 ITALIC	☒	☐	☐	☐	☒	☐	☒
COURIER 10 LANDSCAPE	☒	☐	☐	☐	☐	☒	☐
COURIER 16.6 LANDSCAPE	☒	☒	☐	☐	☐	☒	☐
COURIER 20 LANDSCAPE	☒	☐	☐	☐	☐	☒	☒
LETTER GOTHIC 12	☐	☐	☒	☐	☐	☐	☐
LETTER GOTHIC 16.6	☐	☒	☒	☐	☐	☐	☐
LETTER GOTHIC 24	☐	☐	☒	☐	☐	☐	☒
LETTER GOTHIC 33.34	☐	☒	☒	☐	☐	☐	☒
LETTER GOTHIC 12 ITALIC	☐	☐	☒	☐	☒	☐	☐
LETTER GOTHIC 24 ITALIC	☐	☐	☒	☐	☒	☐	☒
TIMES NORDIC 12	☐	☐	☐	☒	☐	☐	☐
TIMES NORDIC 6	☐	☐	☐	☒	☐	☐	☒
TIMES NORDIC 12 ITALIC	☐	☐	☐	☒	☒	☐	☐
TIMES NORDIC 6 ITALIC	☐	☐	☐	☒	☒	☐	☒

☒ = LED lit

☐ = LED off

Operator Console

To change the current selection, press **FONT ←** or **FONT →** . The LED(s) indicating the currently selected font value go(es) off, and that (those) indicating the next value in the sequence light(s). The selection is cyclic: after the combination indicating the last value in the sequence, the selection recycles to the first.

The fonts in the previous table represent only a part of those resident in the printer. Those not indicated can be selected **ONLY** from line (see Chapter 6).

If you are using a fixed pitch font, the lighting of LED A -> A indicates that any character will be printed at half its nominal width. If the font pitch is proportional, characters will be printed at half their nominal height.

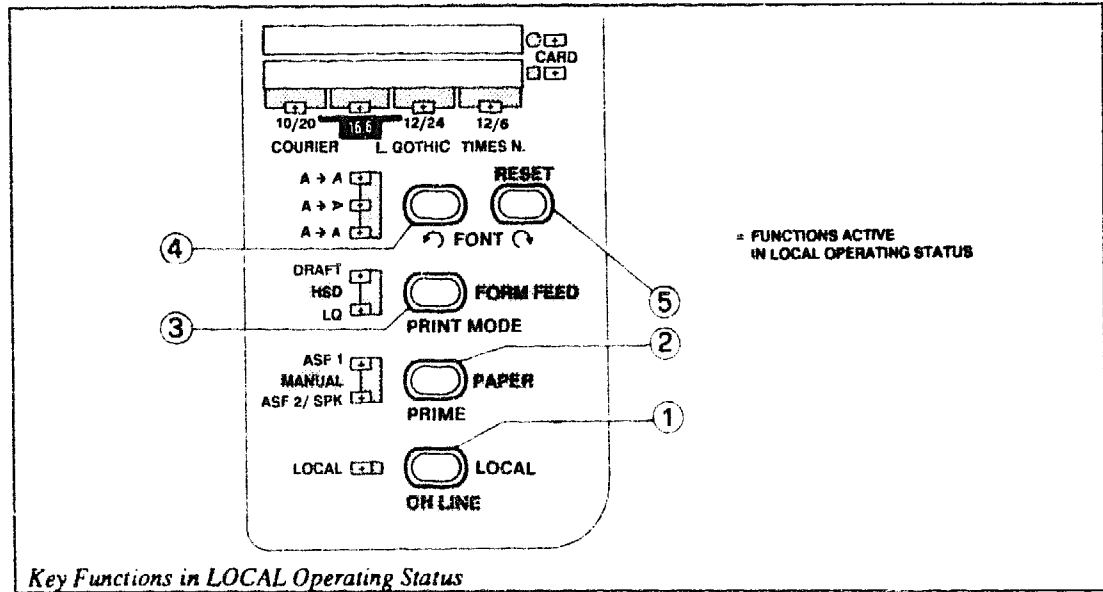
 *If, at printer switch-on, an optional font card is present and recognized in SLOT ●/SLOT ■, the fonts it contains can be selected either in ON-LINE operating status or with a line command. The relevant combinations will be proposed after those of the resident emulation.*

Templates, indicating the relationship between the LEDs and the additional fonts, are supplied for all the font cards available (see Appendix D).

LOCAL Operating Status

If you press **LOCAL** when the printer is ON-LINE, you will set it in LOCAL (Off-Line) operating status; the LOCAL LED lights.

In LOCAL operating status, the printer is no longer under host system control, and cannot receive commands or data from it.



Key Functions in LOCAL Operating Status

The keys execute the following functions:

Key No.	Key Function	Description of Function
1	ON-LINE	Changes the printer operating status to ON-LINE.
2	PAPER	Selects the paper feed device (see specific section in this chapter).
3	FORM FEED	Function depends of paper feed device selected (see specific section in this chapter).
4	SHIFT	Pressed together with another key, executes a specific function (see section entitled SHIFT Operating Status in this chapter).
5	RESET *	Clears any pending data (but does not affect the memory area assigned to DLL **). Restores the parameter default values and sets the printer ON-LINE (see also specific sections in this chapter).

* Hold the key down until the LOCAL LED goes OFF; ** DLL = Down Line Loading.

Operator Console

Paper Feed Device

Using **PAPER**, you can alter the PAPER FEED DEVICE selection. When you press this key, the LED(s) indicating the device currently selected go(es) off and that (those) indicating the next in the selection sequence light. Selection is cyclic: if the LEDs indicate the last device in the sequence, pressing **PAPER** will select the first.

There are three possible settings:

LED \ PAPER FEED DEVICE			
	ASF1	ASF2	MANUAL
ASF1			
ASF2 /SPK			

 = LED lit

 = LED off

 *If the optional ASF2 is installed, it must be selected in printer SET-UP mode (see Chapter 4).*

If the printer is BUSY, pressing **PAPER** will cause the expulsion of the paper from the currently selected device and its insertion to TOF (first print line) on that newly selected. Lack of paper on the device selected will cause the LOCAL LED and the LED(s) indicating the device selected to flash, signalling that operator intervention is required.

Paper Insertion/Expulsion

Depending on the paper feed device selected, the functions of **FORM FEED** will vary, as follows:

- *ASF1/Manual(or optional ASF2 if present and selected):*
 - if paper is present in printer, expels it
 - if there is no paper in the printer, loads a sheet to the TOF position.

 *Pressing this key, with paper already inserted, causes the execution of the "FLUSH" function. This consists of the immediate printing of any pending data, signalled by the flashing of the DRAFT and/or LQ LED(s).*

Print Test

Pressing and holding **RESET** and then **FORM FEED**, until all the LEDs have flashed briefly, causes the print test to be executed.

* *The Print Test can also be executed by holding down FORM FEED at printer switch-on.*

Printer SET-UP

Pressing and holding **RESET** and then **PAPER**, until all the LEDs have flashed briefly, accesses the printer SET-UP operating status.

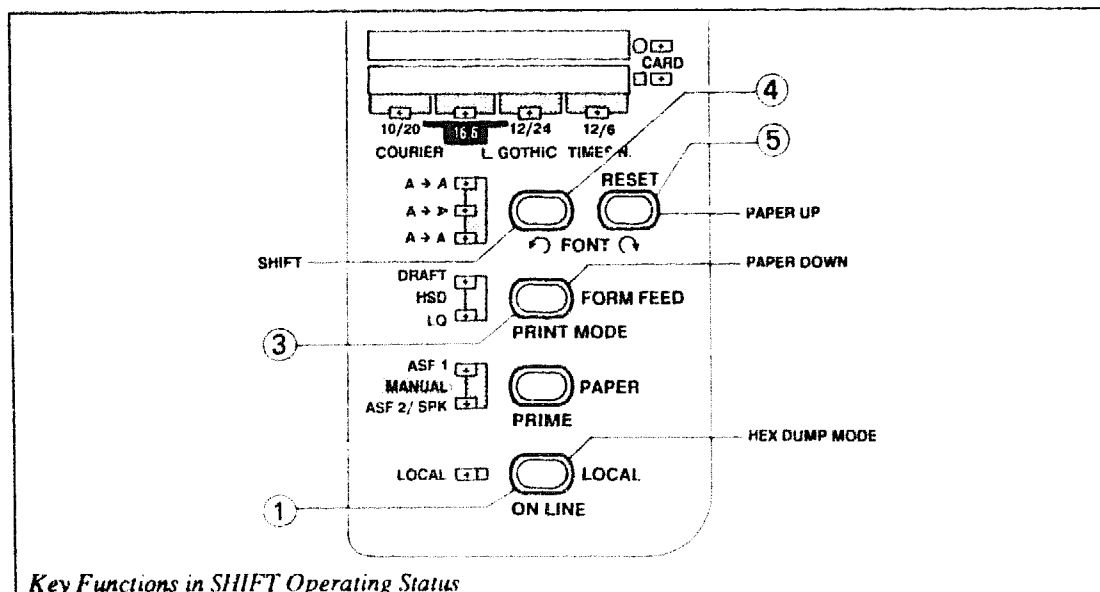
* *Access to the printer SET-UP environment is also possible by holding down PAPER at printer switch-on.*

Operator Console

SHIFT Operating Status

If you press and hold **SHIFT** and then press another key, the printer will execute the specific function assigned to the key pressed. Both keys must be held until the function is completed (the LOCAL LED remains lit).

The key assignments are indicated in the Quick Reference Guide inserted at the end of this manual.



Key Functions in SHIFT Operating Status

In SHIFT operating status, the keys execute the following functions:

Key No.	Key Function	Description of Function
1	HEX DUMP MODE	Held with SHIFT until all the LEDS have flashed, causes all the characters received to be printed in their hexadecimal form.
3	PAPER DOWN	Held with SHIFT, causes reverse paper feed in elementary steps (1/300 in) until released.
4	SHIFT	Function activation key
5	PAPER UP	Held with SHIFT, causes forward paper feed in elementary steps (1/300 in) until released.

HEX DUMP Mode

Pressing simultaneously **SHIFT** and **HEX DUMP MODE**, until all the LEDs have flashed briefly, will cause all the characters received to be printed in their hexadecimal form (see the following example):

```
1B 26 6C 30 4C 1B 26 6C 30 45 1B 26 6C 36 36 46      ←&l0L-&l0E←&l66F
1B 2A 74 33 30 30 52 4A 50 20 33 35 30 20 42 75      ←*t300RJP 350 Bu
62 62 6C 65 20 4A 65 74 20 50 72 69 6E 74 65 72      bble Jet Printer
20 2D 20 44 45 53 4B 4A 45 54 20 50 4C 55 53 20      - DESKJET PLUS
```

Entry into HEX DUMP mode does not affect the current machine conditions.

In HEX DUMP mode, the keys execute the following functions:

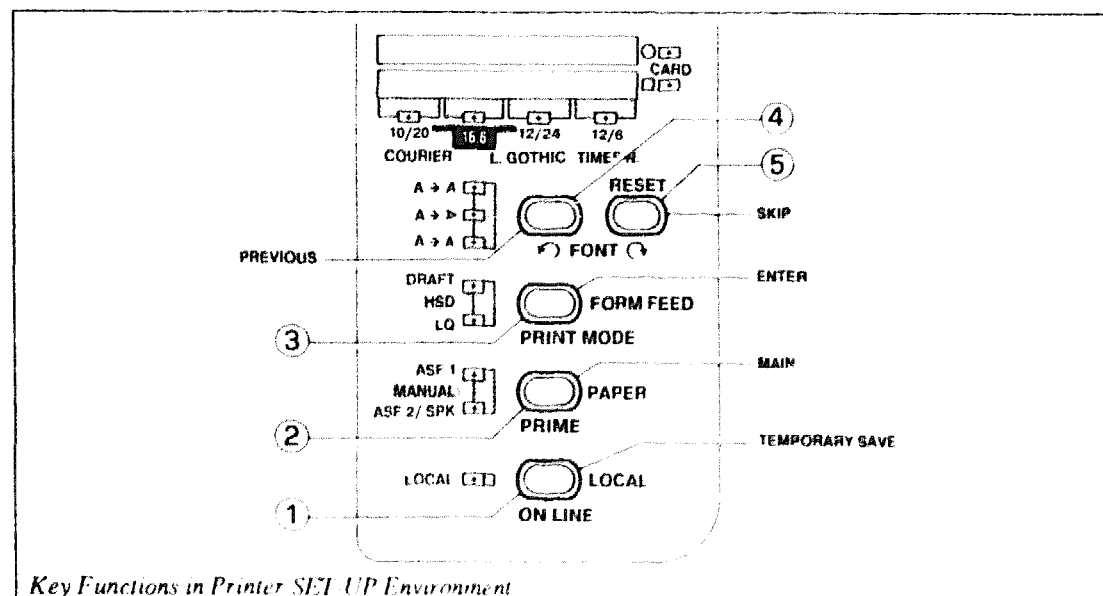
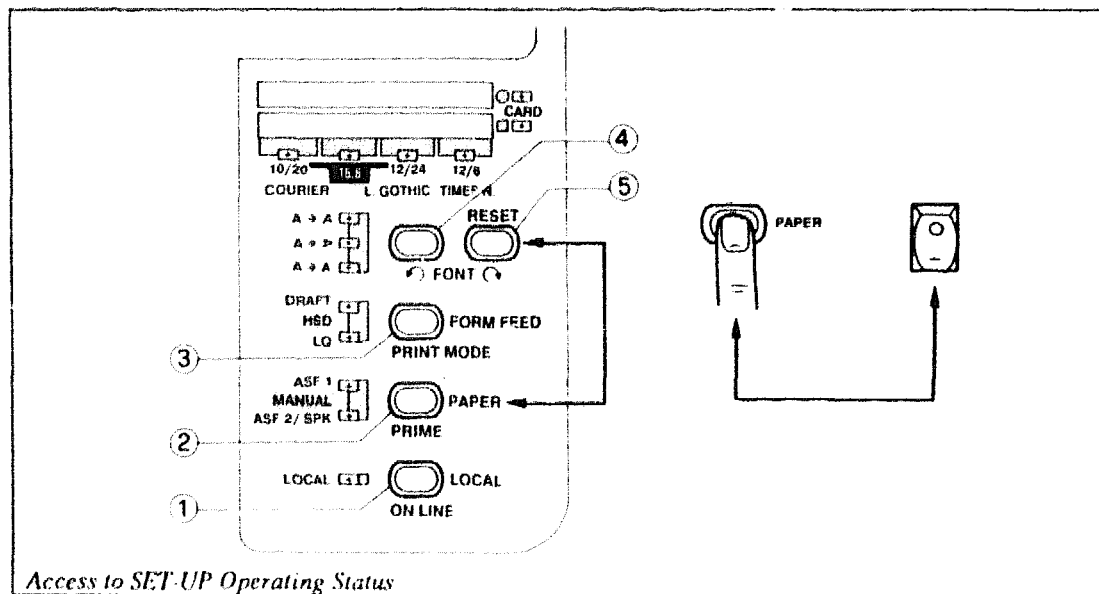
Key Function	Description of Function
LOCAL/ON-LINE	Pressed once, suspends printing; pressed a second time, causes printing to resume
PAPER	With printing suspended, has the same function as in LOCAL.
FORM FEED	With printing suspended, has the same function as in LOCAL.
RESET	With printing suspended, has the same function as in LOCAL.

To exit from HEX DUMP MODE, make sure the printer is FREE and is in LOCAL and then press **SHIFT** and **HEX DUMP MODE** simultaneously, until all the LEDs have flashed briefly.

Operator Console

SET-UP Operating Status

If you hold down **PAPER** at printer switch-on, or if you press **RESET** and then **PAPER** when the printer is switched on and in LOCAL, the printer enters the SET-UP environment; all the LEDs will flash briefly (see Chapter 4 - Printer Programming).



Operator Console

In the printer SET-UP environment, the key functions, which are printed out automatically on access to this operating status, are as follows (for further details, see Chapter 4 - Printer Programming):

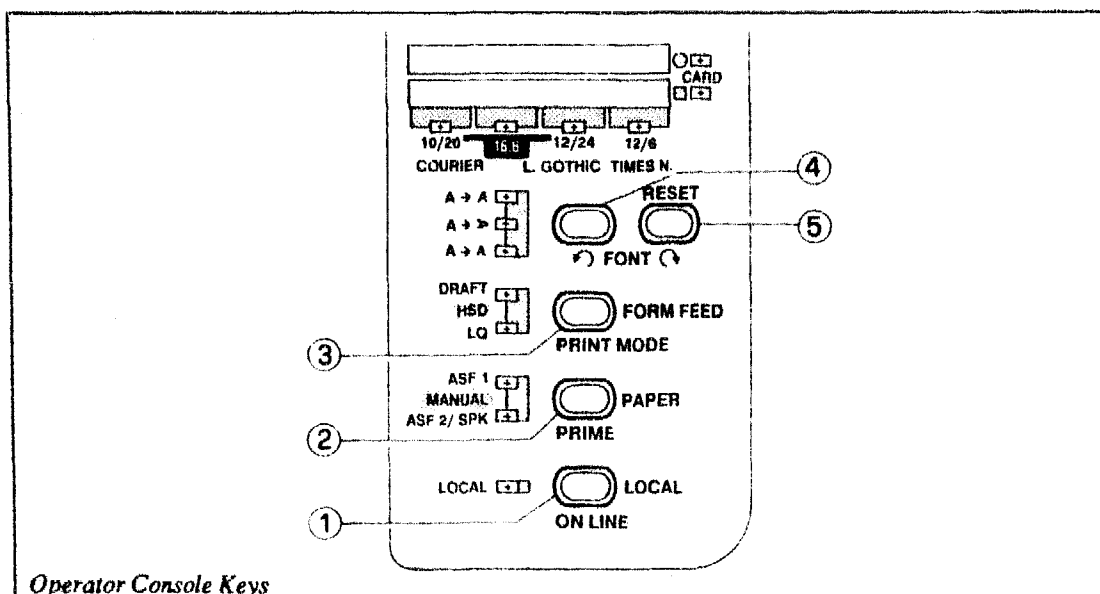
Key Function	Description of Function
TEMPORARY SAVE	Saves the parameter values selected only for the current work session, and exits to ON-LINE operating status.
MAIN	Reproposes the main menu.
ENTER	Selects the parameter indicated by the triangle on print head.
PREVIOUS	Returns to the previous level in the menu structure.
SKIP	Moves the triangle on the print head to indicate the next parameter in the SET-UP menu.

Operator Console

Summary of Key Functions

The following table summarizes the functions on the console keys in the various printer operating statuses.

KEY	ON-LINE	LOCAL	SHIFT	SET-UP
1	LOCAL	ON-LINE	HEX DUMP MODE	TEMP. SAVE
2	PRIME	PAPER		MAIN
3	PRINT MODE	FORM FEED	PAPER DOWN	ENTER
4	FONT ←	SHIFT	SHIFT	PREVIOUS
5	FONT →	RESET	PAPER UP	SKIP



Operator Console Keys

Printer Programming

Printer Programming

Factory Default Values

Whenever it is switched on, your printer will be ready to operate with certain predefined values set for its most important control and operating parameters. On arrival from the manufacturer, these settings are pre-determined - the factory default values. These settings may already meet your requirements, but check them to be sure.

The following table lists the factory default values.

Parameter	Value	Meaning
LPI	6	Line feed value : 6 lines per inch
FORM LENGTH	11.7"	Page length: 11.7 inches (A4 size)
INTERFACE	PARALLEL	Interface: Parallel Centronics-like
WORD LENGTH	8 BITS	Data format: 8 bit
PAPER OPTION	NONE	Optional paper feed device: none
CHARACTER SET	PC-8 INT.	Character set: International
AUTO CR	DISABLE	Automatic carriage return after line feed: NO
AUTO LF	DISABLE	Automatic line feed after carriage return: NO
SLASHED ZERO	DISABLE	Zero: normal (not slashed)
PERFORATION SKIP	ENABLE	Top of form (TOF): 12.7 mm
TEXT SCALE MODE	DISABLE	Reduced LF value to increase lines per page: NO
GRAPHICS DENSITY	75	Graphic printing density: 75 dots per inch (dpi)
MONODIRECT. PRINT	DISABLE	Monodirectional printing: NO

Restoring the Factory Default Values

The factory default values are restored by selecting the DEFAULT parameter in the SAVE menu. This selection will clear any variations made during any printer SET-UP operation, and will restore all the factory default values.

Printer Programming

Printer SET-UP

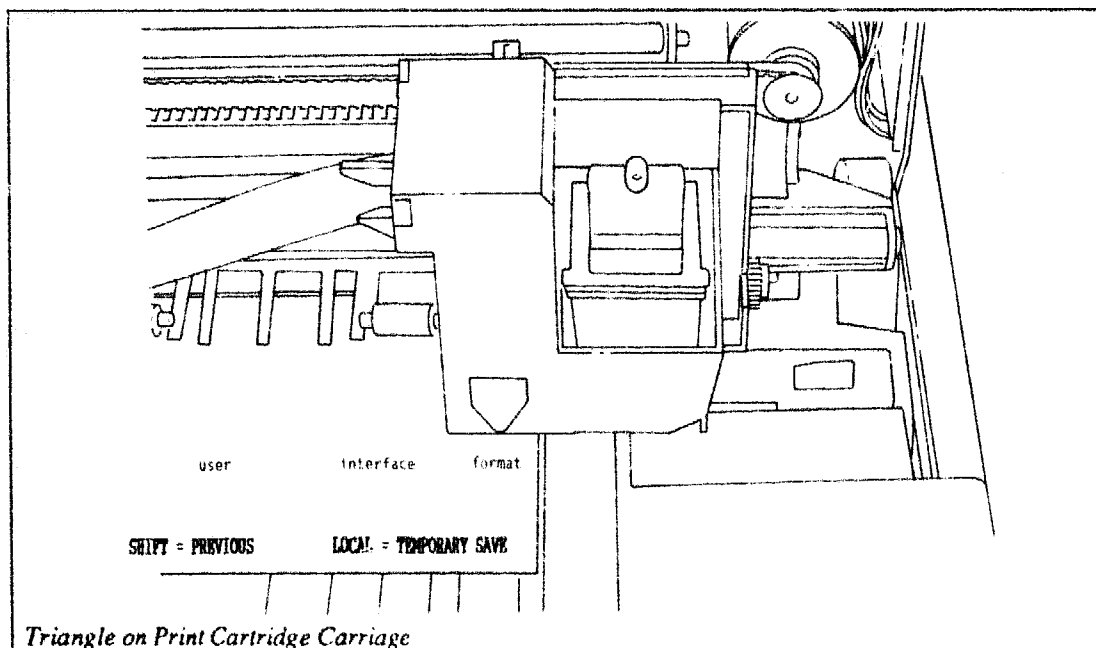
How to Access

With the printer switched off and the standard paper tray loaded and inserted, open the top cover. Holding down **PAPER**, switch the printer on.

 *Release the key after the mechanical reset has been executed. Access to the printer SET-UP environment will be indicated by the brief flashing of all the LEDs.*

If the printer is already powered, you can access the SET-UP operating environment by setting the printer in LOCAL and then pressing and holding **RESET** and then **PAPER**.

The console key functions for this operating environment are printed, followed by the MAIN MENU (FORMAT, INTERFACE, USER and SAVE). The print cartridge carriage is positioned so that the triangle on it indicates the first item in the menu. The LED(s) which indicate the font selected will be off, to indicate that the special FONT (rotated 180°), used for printing out the SET-UP parameters, is selected.



The four items in the MAIN MENU each contains a series of programmable parameters in a sub-menu structure. When you access the various sub-menus, the reference triangle will move to indicate the currently selected value for that parameter.

Console Key Functions in Printer SET-UP

The parameters/values are selected and/or modified using the keys on the operator console. In the printer SET-UP environment, the keys have the following functions:

LOCAL

TEMPORARY SAVE:

Saves any redefined parameter values TEMPORARILY (until the printer is switched off) and exits from SET-UP environment to ON-LINE operating status.

PAPER

MAIN:

Causes the MAIN MENU to be reproposed (reprinted).

FORM FEED

ENTER:

Selects the item/value indicated by the triangle on the print cartridge carriage.

SHIFT

PREVIOUS:

Returns to the previous menu level.

RESET

SKIP:

Moves the print cartridge carriage so that its triangle indicates the next item/value in the current menu.

How to Exit

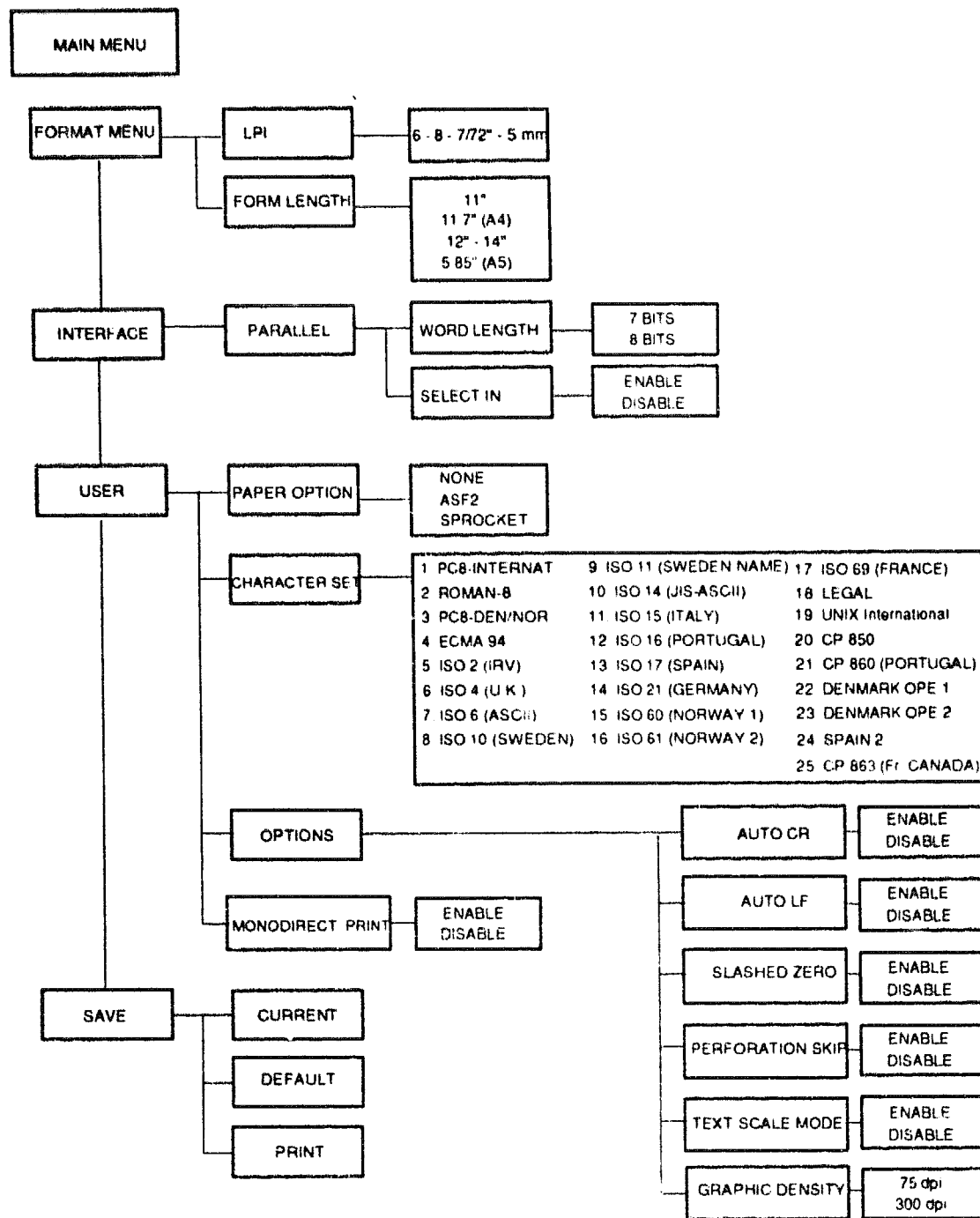
You can exit from the SET-UP environment at any time or from any point in the programming procedure, in either of the following two ways:

1. Pressing **LOCAL** to save the currently redefined parameters TEMPORARILY (until the printer is switched off; at the next printer switch-on the previous PERMANENTLY saved values for such parameters will be restored).
2. Selecting parameter SAVE in the SAVE MENU to save all the parameter values PERMANENTLY (until the next programming session).

In both cases, the printer exits to ON-LINE operating status.

SET-UP Parameters

The following flowchart contains all the programmable parameters available in the SET-UP menu.



Printer Programming

The table below contains all the programmable parameters in the SET-UP menu and their values. The factory default **VALUE** is indicated in **BOLDFACE**.

PARAMETER	VALUES	DESCRIPTION
FORMAT		Document format menu
LPI	6 - 8 - 7/72" - 5 mm	Defines the linespacing value to be used in the printed text. The first two values are in lines per inch (lpi); the second pair of values are absolute values.
FORM LENGTH	11" - 11.7" (A4) - 12" - 5.85" (A5) - 14"	Defines the form length in inches.
INTERFACE	PARALLEL	Interface selection menu.
		Centronics-like parallel interface
WORD LENGTH	7 BITS - 8 BITS	Bits per character. Must be the same as the setting on your host system.
SELECT IN	ENABLE - DISABLE	Handled only in the optional IBM or EPSON emulation.
USER		User menu
PAPER OPTION	NONE - ASF2 - SPROCKET	Optional paper feed device installed (see Chapter 5 - Paper, and specific device documentation).
CHARACTER SET	PC-8 INTERNAT. , ROMAN 8, PC-8 DK/N ECMA 94, ISO 2, ISO 4 ISO 6, ISO 10, ISO 11 ISO 14, ISO 15, ISO 16 ISO 17, ISO 21, ISO 60 ISO 61, ISO 69, LEGAL UNIX, CP850, CP 860 DK OPE 1, DK OPE 2 SPAIN 2, CP 863	Choice of character generator.

Printer Programming

OPTIONS

AUTO CR

**ENABLE -
DISABLE**

Miscellaneous parameters

Automatic carriage return.

Defines whether or not, on reception of a line feed command, an automatic carriage return will also be executed.

For file formats which have only LF as a line delimiter, the selection of "AUTO CR ENABLED" (LF = LF+CR) is obligatory.

AUTO LF

**ENABLE -
DISABLE**

Automatic line feed.

Defines whether or not, on reception of a carriage return command, an automatic line feed will also be executed.

For file formats which have only CR as a line delimiter, the selection of "AUTO LF ENABLED" (CR = CR+LF) is obligatory.

***** *For MS-DOS file format, which has an LF + CR pair as the delimiter, the settings $LF = LF/CR = CR$ and $LF = LF+CR/CR = CR$ give the same practical result. For UNIX files, the latter setting **MUST** be used.*

SLASHED ZERO

**ENABLE -
DISABLE**

Enables/disables the automatic printing of the slashed zero.

Helps to differentiate between the zero and the upper case O.

**PERFORATION
SKIP**

**ENABLE -
DISABLE**

When enabled, sets a 1/2" (12.7 mm) TOF on single sheets.

**TEXT SCALE
MODE**

**ENABLE -
DISABLE**

When enabled, permits the recovery of the BOF area (~1/2") by reducing automatically the defined line feed value.
E.g.: on an 11" page, with a 1/6" line feed value, 66 lines can be printed.

**GRAPHIC
DENSITY**

75 - 300 dpi

Graphic printing density, expressed in dots per inch (dpi).

Printer Programming

MONODIREC-
TIONAL PRINT

ENABLE -
DISABLE

When enabled, printing will always be "one-way" (this improves character alignment particularly for graphics).

SAVE

Save menu

CURRENT

Stores permanently the selected settings.

DEFAULT

Restores the factory default values.

PRINT

Prints out the current settings.

Printer Programming

How to Redefine the Parameter Values

This section explains how to vary and save the values of a series of parameters in the different sub-menus.

Programming Example

In this example, we are going to change:

- the form length to 12 inches (FORM LENGTH 12")
- the character generator to ECMA 94 (CHARACTER SET ECMA 94)
- the type of zero printed (SLASHED ZERO ENABLED),

and then save permanently all the settings.

The procedure is explained step-by-step and the effect of the operator action on the printer is indicated in *italics*. The figure shows the resulting print-out (reading from bottom to top of the page).

Operating Procedure

Access the printer SET-UP environment, by holding down **PAPER** as you switch on the printer (or, if the printer is already powered and in LOCAL status, by pressing **RESET** and then **PAPER**).

The key functions and the MAIN MENU are printed, and the triangle on the print cartridge carriage indicates the first sub-menu (FORMAT).

Press **ENTER**

FORMAT is underscored to indicate its selection, its contents are printed and the triangle on the print cartridge carriage indicates the first parameter (LPI).

Press **SKIP** and then **ENTER**

The triangle is positioned to indicate FORM LENGTH, which is underscored to indicate its selection. The page length values are then printed.

Press **SKIP** to select the value desired (12"), and then **ENTER** to confirm its selection.

The value 12" is underscored, and the current menu (FORMAT) is reproposed automatically.

Press **MAIN** to return to the main menu.

The main menu is printed and the triangle on the print cartridge carriage is positioned to indicate the first sub-menu (FORMAT).

Printout of Programming Example

RESSET = SKIP FORM FREQ = ENTER PAPER = MAIN SHIFT = PREVIOUS LOCAL = TEMPORARY SAVE

Printer Programming

Press **SKIP** twice, and then **ENTER** to select the USER MENU.

USER is underscored to indicate its selection, and its contents are printed out. The triangle will indicate the first parameter (PAPER OPTION).

Press **SKIP** and then **ENTER**

CHARACTER SET is underscored to indicate its selection. All the resident character sets each, of which is assigned a number, are printed out. The numbers are repeated in the last line of the print out.

Press **SKIP** to select the character set desired (ECMA 94), and then **ENTER** to confirm the selection.

Number 4, corresponding to the ECMA 94 character set, will be underscored. The USER MENU will be repropose automatically.

Press **SKIP** twice to select the parameter group desired, and then **ENTER** to confirm the selection.

OPTIONS is underscored to indicate its selection, and its contents are printed out. The triangle will indicate the first parameter (AUTO CR).

Press **SKIP** twice, and then **ENTER** to select the parameter SLASHED ZERO.

SLASHED ZERO is underscored to indicate its selection, followed by its possible values.

Press **SKIP** to pass to the value ENABLE, and then **ENTER**

ENABLE is underscored to indicate the selection of the slashed zero. The OPTIONS parameter group is repropose automatically.

Press **MAIN** to return to the main menu.

The main menu is repropose and the triangle on the print cartridge carriage will indicate the first sub-menu (FORMAT).

Press **SKIP** three times, and then **ENTER** to select the SAVE MENU.

SAVE is underscored to indicate its selection and its contents are printed out. The triangle indicates the first parameter (CURRENT).

Press **SKIP** twice, and then **ENTER** to select the parameter print-out feature.

PRINT is underscored, and the parameters, with their current values, are printed. The main menu will then be repropose automatically, with the triangle indicating the first sub-menu (FORMAT).

Printer Programming

Press **SKIP** three times, and then **ENTER** to select the SAVE MENU.

SAVE is underscored to indicate its selection and its contents are printed out. The triangle indicates the first parameter (CURRENT).

Press **ENTER** to confirm the selection.

CURRENT is underscored to indicate its selection.

The three parameter values modified, together with all the other values, are stored permanently.

Once the SAVE function is completed, the printer will exit automatically from the printer SET-UP environment to ON-LINE operating status.

Paper

Your printer can handle a wide range of paper types. This chapter describes the characteristics of the types of paper accepted, the paper handling devices and the paper loading procedures.

Paper Characteristics

Types

Most types of paper give good printing quality. Best results are obtained using standard photocopy paper. Always test thoroughly the type of paper you intend to use.

Dimensions

The following table contains the dimensions of the types of paper which you can use in your printer:

Single Sheets	Envelopes
A5 (148 mm x 210 mm / 5.82" x 8.26")	COM-10 (4 1/8" x 9.5")
A4 (210 mm x 297 mm / 8.26" x 11.7")	C5 (228.9 mm x 162 mm/9.0" x 6.37")
Letter (8.5" x 11")	DL (110 mm x 220 mm/4.33" x 8.66")
Legal (8.5" x 14")	

The horizontal A5 and vertical A4 formats can be inserted either manually or using the standard paper tray.

The Letter and Legal formats can only be inserted manually in the standard version of the printer. A specific paper tray for automatic feed is available as an option.

Envelopes can **only** be inserted manually.

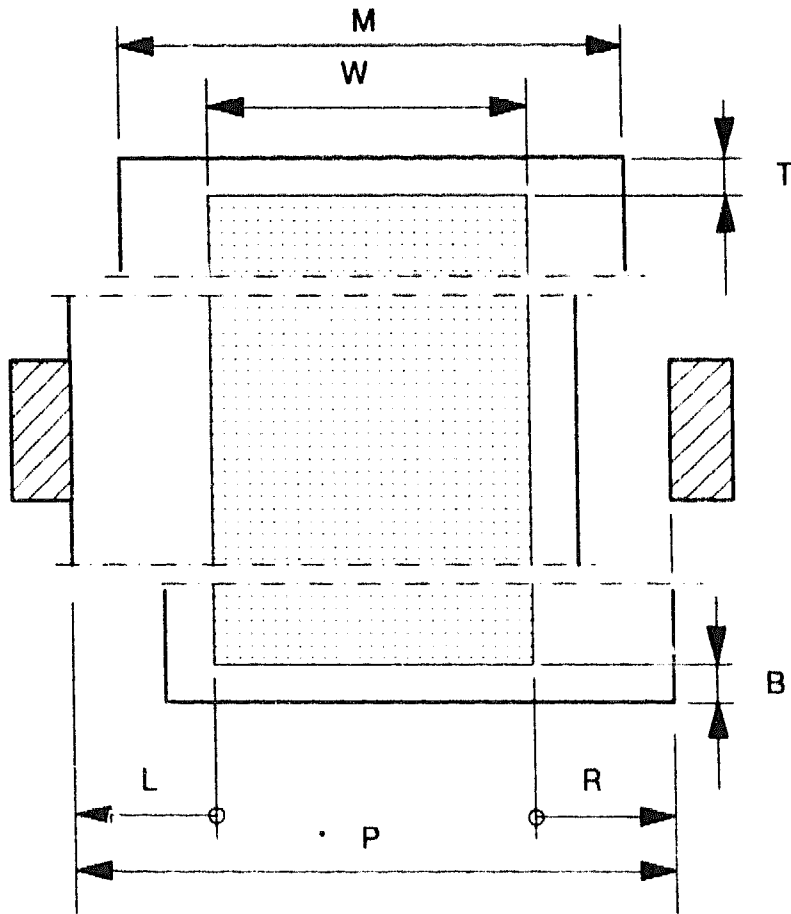
Other paper formats, between 210 and 241.3 mm (8.26" to 9.5") wide and 110 and 510 mm (4.33" to 20.0") long, must be inserted manually.

The paper weight must be between 70 and 90 g/m².

Paper

Print Area

The maximum print area on the page is illustrated in the following diagrams (all measurements indicated are in millimetres and inches). It will vary according to the type of paper.



Single sheets/envelopes	A4	L/L	C5	DL	COM-10
M (max. width standard sheet)	210 mm/8.26"	215.9 mm/8.5"	228.9 mm/9.01"	220 mm/8.66"	241.3 mm/9.5"
W (max. print line length)	203.2 mm/8"	203.2 mm/8"	203.2 mm/8"	203.2 mm/8"	203.2 mm/8"
L (min. left margin)	3.4 mm/0.134"	9.3 mm/0.37"	--	--	--
R (min. right margin)	3.4 mm/0.134"	3.4 mm/0.134"	--	--	--
T (min. top margin - TOF)	0	0	0	0	0
B (min. bottom margin - BOF)	12.7 mm/0.5"	12.7 mm/0.5"	12.7 mm/0.5"	12.7 mm/0.5"	12.7 mm/0.5"

 The maximum paper feed path (P) is 254 mm/10".

Paper Handling Devices

Paper can be inserted in the standard printer either:

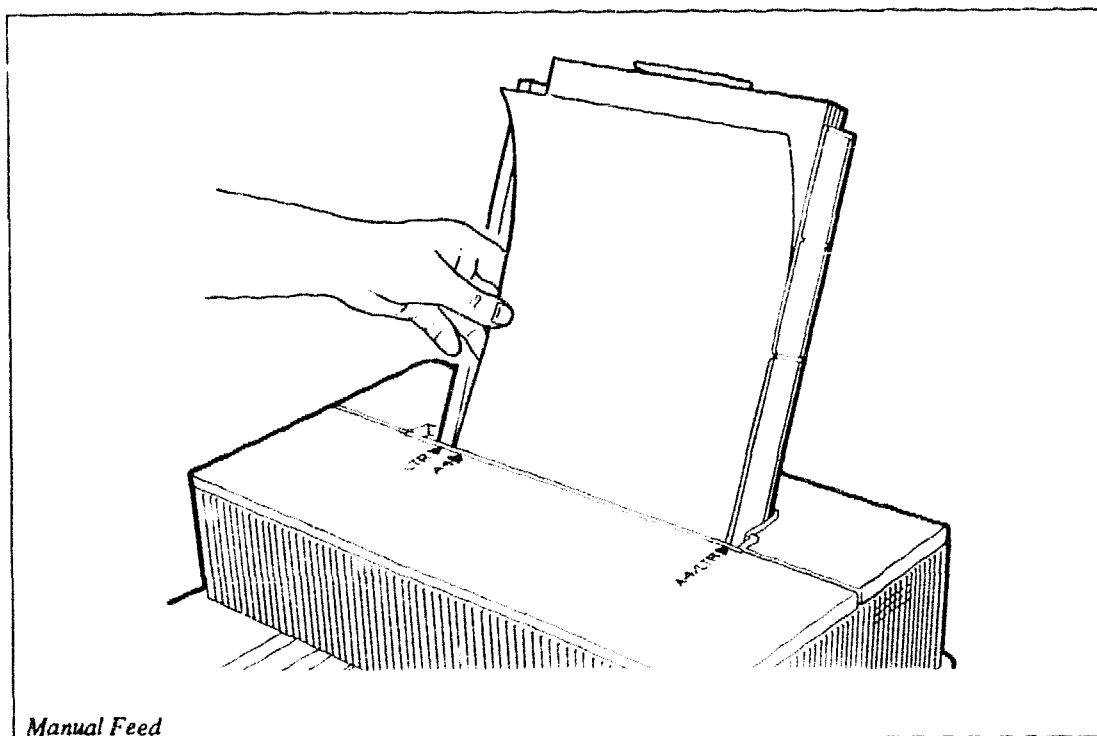
- manually, or
- using the paper tray (ASF1) supplied.

A second optional paper tray (ASF2) is available on request:

* *The instructions for installing and using the optional device are supplied with the individual option.*

Manual Feed

The manual feed allows you to position a sheet of paper or envelope correctly and guide it during feed-in.

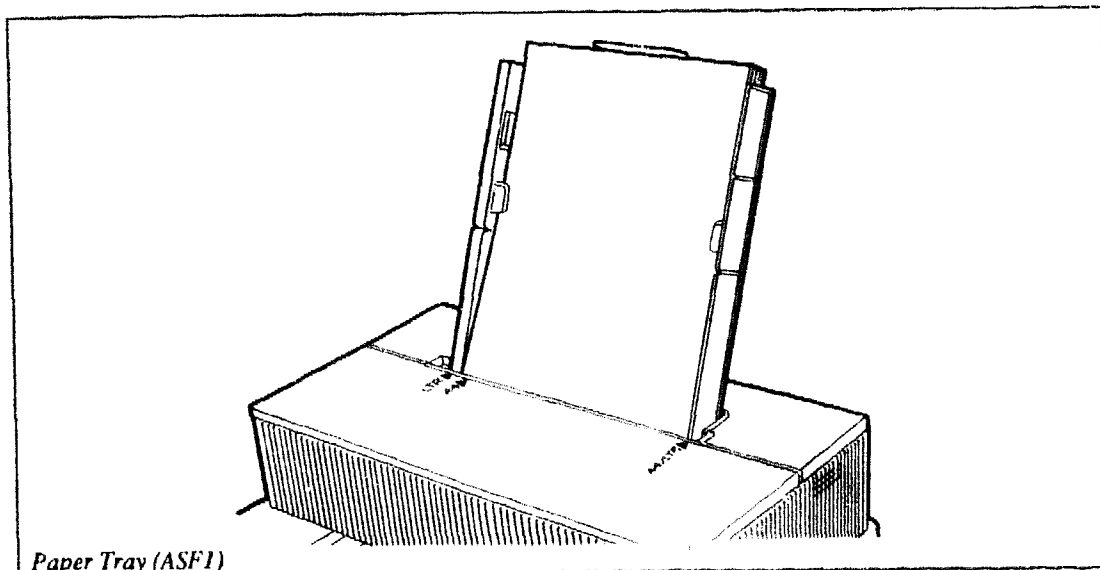


Manual Feed

Paper

Paper Tray (ASF1)

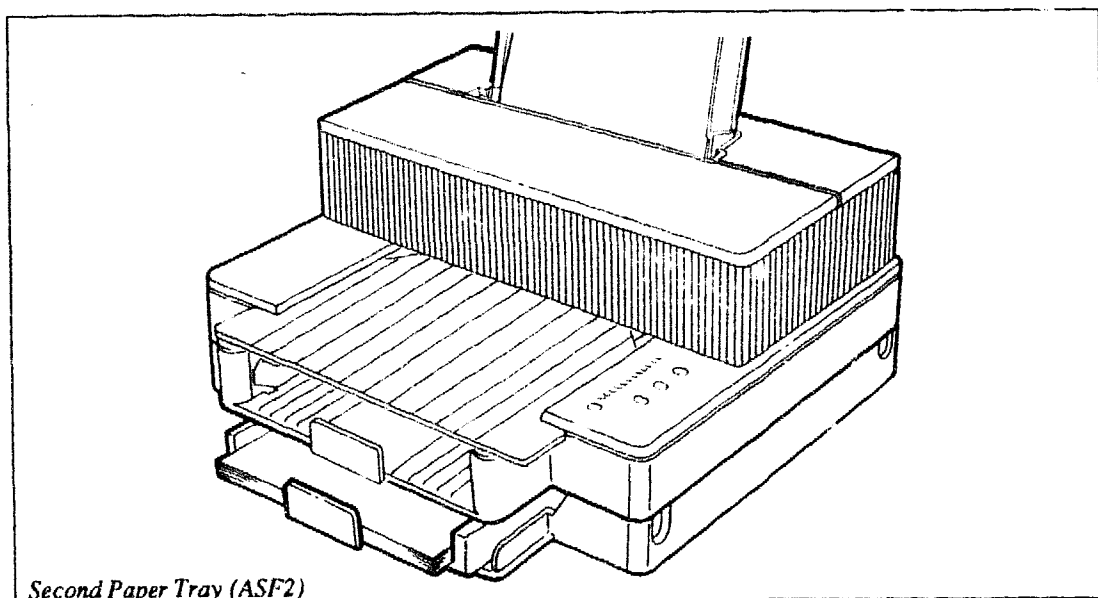
This device holds a pack of single sheets (capacity: 150 x 80 g/m² sheets) which will be inserted automatically, one at a time.



Paper Tray (ASF1)

Second Paper Tray (ASF2 - optional)

This device holds a second pack of single sheets and has the same capacity as the standard paper tray. Paper feed from one or other of the paper trays is controlled by line commands (the existence of ASF2 must be indicated in Initial SET-UP mode).



Second Paper Tray (ASF2)

Loading the Paper

 *Read Chapter 1 - Installation - carefully, before switching on the printer.*

Paper Insertion (from ASF1)

 *Check that the ASF1 LED on the operator console is lit. If it is not, see Chapter 4 - Printer Programming and Chapter 3 - Local SET-UP, to select the standard paper tray.*

The procedure for loading the paper is described in Chapter 1.

Manual Insertion (Single Sheet/Envelope)

 *The sheet of paper/envelope must not be crumpled or torn, otherwise it may jam or even not be inserted.*

1. Press **LOCAL** , to set the printer in LOCAL
2. Press **PAPER** repeatedly until both ASF1 and ASF2/SPK LEDs are lit.

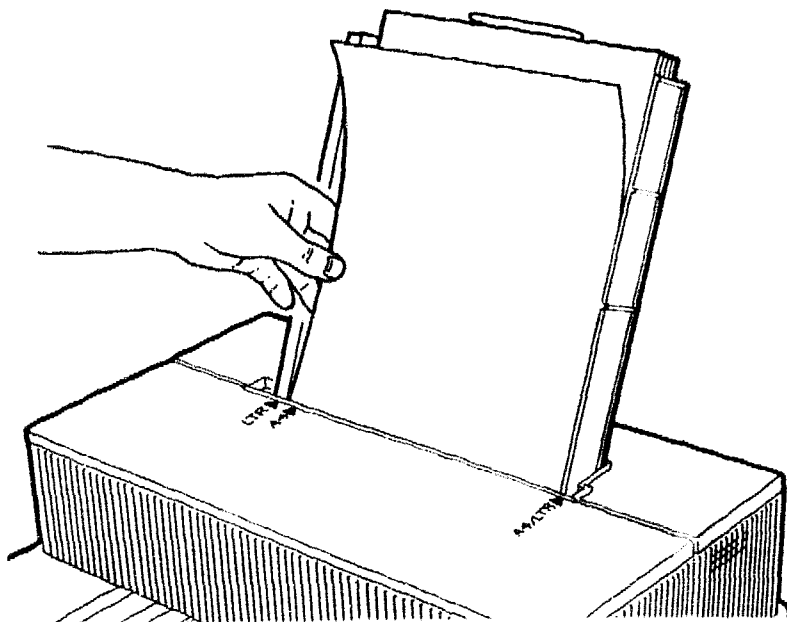
 *Manual paper feed selection can be made only when the printer is in FREE condition.*

3. Align the sheet of paper/envelope horizontally with the reference marks on the printer cover, and push it down until it stops against the feed rollers.

The sheet of paper/envelope **must** be inserted without removing the paper tray, allowing the use of individual sheets/forms different from those in the tray.

4. Press **FORM FEED** ; the sheet will be fed in and aligned at the first print position.

Paper



Manual Insertion of Single Sheets/Envelopes

5. Press **LOCAL** to set the printer in ON-LINE operating status, so that the text to be printed can be transmitted from the host.

Code Interpreters, Character Generators and Fonts

This chapter introduces the concepts of emulation and character generators and explains the practical results they have on your work.

Code Interpreter

Most printers have built-in intelligence, which interprets the data which is transmitted from the host system, and checks it for certain control sequences. If any such sequences are found, the printer performs a specific function.

There is no universal data control method. As printer technology has developed, most major printer manufacturers have created their own "standards" for printer control, depending on the type of printer technology used, the intended application range, etc. These sets of commands can emulate the Industry Standard code sets of other printers, making them behave exactly as the original printer.

To be compatible with all the various standards, a printer must be extremely flexible. This printer is a front-runner in terms of versatility. Its resident firmware and optional cards give you the possibility of operating in several different emulation environments.

The standard printer version operates with the Hewlett-Packard PCL level III (Printer Command Language) code set called DeskJet PLUS.

The DeskJet PLUS code set contains all the commands for the HP DeskJet PLUS printer, and a number of specific codes for additional features which are not present in this emulation (see Chapter 7 - Command Codes).

The following optional emulation cards are also available:

1. EPSON FX 850 emulation
2. IBM Proprinter 4201/02.

Depending on the applications you intended to use, you can choose the emulation which suits best your needs. Chapter 2 explains how to install the emulation you require.

Once an emulation card has been inserted and selected only the command code set contained in it will be used. To return to the resident HP DeskJet PLUS emulation, the optional emulation card must first be removed.

Code interpreters, Character Generators and Fonts

Character Generators

A character generator is the firmware device which assigns a specific printable character and its actual shape to each data byte. Unfortunately, there is no all-in-one character generator, as individual needs differ too much. In the PC and printer world, a character generator contains up to 255 different "characters". Of these 255 characters, the codes from 0 to 127 are standardized and contain the so-called ASCII codes. This is the American character set, which excludes all European national characters and symbols as well as the semi-graphic signs.

The assignment of codes between 128 and 255 varies from country to country, from hardware to hardware, from operating system to operating system and often even from application software to application software. Before selecting a particular generator, you must read your operating system/software application documentation carefully.

The printer default setting (PC-8 INTERNATIONAL) will probably be the one you require. If not, your printer offers you a wide choice of resident character generators:

ROMAN8; PC-8 DENMARK/NORWAY; ISO 8859/1 (ECMA-94); ISO 2 (IRV); ISO 4 (U.K.); ISO 6 (ASCII); ISO 10 (SWEDEN); ISO 11 (SWEDEN: NAMES); ISO 14 (JIS - ASCII); ISO 15 (ITALY); ISO 16 (PORTUGAL); ISO 17 (SPAIN); ISO 21 (GERMANY); ISO 60 (NORWAY 1); ISO 61 (NORWAY 2); ISO 69 (FRANCE); LEGAL; UNIX INTERNATIONAL; CP 850; CP 860 (PORTUGAL); DK OPE 1; DK OPE 2; SPAIN 2; CP 863 * (FRENCH CANADA).

* Although not indicated in the individual optional Font Card manuals, the character generator CP 863 is also available for all the optional fonts.

* *A number of optional character generators are available for specific applications (Math 7 / 8 / 8A / 8B, Pi Font / a) and particular national character sets (Israel, Turkey, Greece).*

The character assignment tables for the resident generators are given at the end of this chapter.

The character sets can be selected in the printer SET-UP environment or using line commands (see following table).

The "open" bracket, in the ESCAPE sequence, indicates the selection of the primary character set; the "close" bracket indicates the selection of the secondary character set.

Code Interpreters, Character Generators and Fonts

The first table contains the resident character sets; the second, those available with special optional fonts on optional font cards.

Character Set	Commands	
Roman8	ESC (8 U	ESC) 8 U
PC-8	ESC (10 U	ESC) 10 U
PC-8 Denmark/Norway	ESC (11 U	ESC) 11 U
ECMA-94 Latin 1	ESC (0 N	ESC) 0 N
ISO United Kingdom (04)	ESC (1 E	ESC) 1 E
ISO Germany (21)	ESC (1 G	ESC) 1 G
ISO France (69)	ESC (1 F	ESC) 1 F
ISO Italy (15)	ESC (0 I	ESC) 0 I
ISO Norway v. 1 (60)	ESC (0 D	ESC) 0 D
ISO Norway v. 2 (61)	ESC (1 D	ESC) 1 D
ISO Sweden: Names (11)	ESC (0 S	ESC) 0 S
ISO Sweden (10)	ESC (3 S	ESC) 3 S
ISO Spain (17)	ESC (2 S	ESC) 2 S
ASCII (06)	ESC (0 U	ESC) 0 U
ISO IRV (02)	ESC (2 U	ESC) 2 U
ISO Portugal (16)	ESC (4 S	ESC) 4 S
JIS ASCII (14)	ESC (0 K	ESC) 0 K
Legal	ESC (1 U	ESC) 1 U
UNIX International	ESC (13 U	ESC) 13 U
CP 850	ESC (12 U	ESC) 12 U
CP 860 (Portugal	ESC (33 I	ESC) 33 I
Denmark OPE 1	ESC (35 P	ESC) 35 P
Denmark OPE 2	ESC (34 P	ESC) 34 P
Spain 2	ESC (33 P	ESC) 33 P
CP 863 (French Canada)	ESC (34 I	ESC) 34 I

Character Set	Commands	
Math7	ESC (0 M	ESC) 0 M
Math8a	ESC (0 Q	ESC) 0 Q
Math8b	ESC (1 Q	ESC) 1 Q
Math8	ESC (8 M	ESC) 8 M
Pi Font	ESC (15 U	ESC) 15 U
Pi Fonta	ESC (2 Q	ESC) 2 Q

Code Interpreters, Character Generators and Fonts

Fonts

A font is a group of characters which all belong to the same character set and have the same typeface, the same style, the same height and print pitch and the same stroke weight.

Your printer handles three types of font:

- the resident fonts, which are always available
- optional fonts on font cards.

The fonts resident in the printer have the following characteristics:

Orientation	Portrait	Portrait	Portrait	Landscape
Character set *	PC-8 Int.	PC-8 Int.	PC-8 Int.	PC-8 Int.
Horizontal spacing	Fixed	Fixed	Fixed	Fixed
Pitch	5, 10, 16.67, 20	5, 10, 16.67, 20	5, 10, 20	10, 20, 16.67
Height (points)	6, 12	6, 12	6, 12	6, 12, 24
Style	Upright	Upright	Italic	Upright
Stroke weight **	Medium/ Bold	Medium/ Bold	Medium/ Bold	Medium/ Bold
Typeface	High Speed Draft	Courier	Courier	Courier

Orientation	Portrait	Portrait	Portrait	Portrait
Character set *	PC-8 Int.	PC-8 Int.	PC-8 Int.	PC-8 Int.
Horizontal spacing	Fixed	Fixed	Proportional	Proportional
Pitch	12, 16.67, 24, 33.3	12, 24	Proportional	Proportional
Height (points)	9.5, 12	6, 12	6, 12	6, 12
Style	Upright	Italic	Upright	Italic
Stroke weight **	Medium/ Bold	Medium/ Bold	Medium/ Bold	Medium/ Bold
Typeface ***	Letter Gothic	Letter Gothic	Times Nordic	Times Nordic

* Default character set; other resident character sets are available (see Resident Character Generator Tables).

** The BOLD attribute can only be selected from line

*** The Letter Gothic character heights 4.75 and 6 points and pitch 8.34 cpi, and a Line Draw font (6 / 12 pt, 6 / 12 / 24 cpi, medium/bold) which is available with Letter Gothic typeface, can be selected only from line (see commands in next paragraph.)

Code Interpreters, Character Generators and Fonts

To select a font from line, set the printer On-Line and then send one of the following ESCape sequences (with the appropriate variable characteristics). For each font, the first line gives the ASCII sequence, the second, the corresponding decimal codes:

Letter Gothic 4.75 pt 8.34 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 8.34 h 4.75 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 56 46 51 52 104 52 46 55 53 118 48 115 48 98 54
116 Ⓢ 81

Letter Gothic 4.75 pt 16.67 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 16.67 h 4.75 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 49 54 46 54 55 104 52 46 55 53 118 48 115 48 98
54 116 Ⓢ 81

Letter Gothic 4.75 pt 33.34 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 33.34 h 4.75 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 51 51 46 51 52 104 52 46 55 53 118 48 115 48 98
54 116 Ⓢ 81

Letter Gothic 6 pt 6 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 6 h 6 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 54 104 54 118 48 115 48 98 54 116 Ⓢ 81

Letter Gothic 6 pt 12 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 12 h 6 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 49 50 104 54 118 48 115 48 98 54 116 Ⓢ 81

Letter Gothic 6 pt 24 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 24 h 6 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 50 52 104 54 118 48 115 48 98 54 116 Ⓢ 81

Letter Gothic 12 pt 6 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 6 h 12 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 54 104 49 50 118 48 115 48 98 54 116 Ⓢ 81

Letter Gothic 9.5 pt 8.34 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 8.34 h 9.5 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 56 46 51 52 104 57 46 53 118 48 115 48 98 54 116
Ⓢ 81

Letter Gothic 9.5 pt 33.34 cpi:

ESC (Ⓢ ESC (s Ⓢ u 0 p 33.34 h 9.5 v 0 s 0 b 6 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 48 112 51 51 46 51 52 104 57 46 53 118 48 115 48 98 54
116 Ⓢ 81

Code Interpreters, Character Generators and Fonts

Letter Gothic Italic 6 pt 6 cpi:

ESC (① ESC (s ② u 0 p 6 h 6 v 1 s 0 b 6 t ③ Q
27 40 ① 27 40 115 ② 117 48 112 54 104 54 118 49 115 48 98 54 116 ③ 81

Letter Gothic Italic 6 pt 12 cpi:

ESC (① ESC (s ② u 0 p 12 h 6 v 1 s 0 b 6 t ③ Q
27 40 ① 27 40 115 ② 117 48 112 49 50 104 54 118 49 115 48 98 54 116 ③ 81

Letter Gothic Italic 6 pt 24 cpi:

ESC (① ESC (s ② u 0 p 24 h 6 v 1 s 0 b 6 t ③ Q
27 40 ① 27 40 115 ② 117 48 112 50 52 104 54 118 49 115 48 98 54 116 ③ 81

Letter Gothic Italic 12 pt 6 cpi:

ESC (① ESC (s ② u 0 p 6 h 12 v 1 s 0 b 6 t ③ Q
27 40 ① 27 40 115 ② 117 48 112 54 104 49 50 118 49 115 48 98 54 116 ③ 81

Line Draw 6 pt 6 cpi:

ESC (0 L ESC (s ② u 0 p 6 h 6 v 0 s 0 b 0 t ③ Q
27 40 48 76 27 40 115 ② 117 48 112 54 104 54 118 48 115 48 98 48 116 ③ 81

Line Draw 6 pt 12 cpi:

ESC (0 L ESC (s ② u 0 p 12 h 6 v 0 s 0 b 0 t ③ Q
27 40 48 76 27 40 115 ② 117 48 112 49 50 104 54 118 48 115 48 98 48 116 ③ 81

Line Draw 6 pt 24 cpi:

ESC (0 L ESC (s ② u 0 p 24 h 6 v 0 s 0 b 0 t ③ Q
27 40 48 76 27 40 115 ② 117 48 112 50 52 104 54 118 48 115 48 98 48 116 ③ 81

Line Draw 12 pt 6 cpi:

ESC (0 L ESC (s ② u 0 p 6 h 12 v 0 s 0 b 0 t ③ Q
27 40 48 76 27 40 115 ② 117 48 112 54 104 49 50 118 48 115 48 98 48 116 ③ 81

Line Draw 12 pt 12 cpi:

ESC (0 L ESC (s ② u 0 p 12 h 12 v 0 s 0 b 0 t ③ Q
27 40 48 76 27 40 115 ② 117 48 112 49 50 104 49 50 118 48 115 48 98 48 116 ③ 81

Line Draw 12 pt 24 cpi:

ESC (0 L ESC (s ② u 0 p 24 h 12 v 0 s 0 b 0 t ③ Q
27 40 48 76 27 40 115 ② 117 48 112 50 52 104 49 50 118 48 115 48 98 48 116 ③ 81

Code Interpreters, Character Generators and Fonts

The following tables contain the values for the three variable characteristics. The first two columns of each table contain the ASCII and decimal codes respectively; the third column indicates the variable (symbol set, attribute, print quality).

①		Symbol Set	①		Symbol Set
8U	(56 85)D	ROMAN-8	2S	(50 83)D	ISO 17
11U	(49 49 85)D	PC D/N	1G	(49 71)D	ISO 21
2U	(50 85)D	ISO 2	10U	(49 48 85)D	PC US
1E	(49 69)D	ISO 4	0N	(48 78)D	ECMA-94
0U	(48 85)D	ISO 6	0D	(48 68)D	ISO 60
3S	(51 83)D	ISO 10	1D	(49 68)D	ISO 61
0S	(48 83)D	ISO 11	1F	(49 70)D	ISO 69
0K	(48 75)D	ISO 14	13U	(49 51 85)D	OLI-UNIX
0I	(48 73)D	ISO 15	1U	(49 85)D	HP LEGAL
4S	(52 83)D	ISO 16	12U	(49 50 85)D	CP 850
33I	(51 51 73)D	CP 860 (Port.)	35P	(51 53 80)D	DENM. OPE 1
34P	(51 52 80)D	DENM. OPE 2	33P	(51 51 80)D	SPAIN 2
34I	(51 52 73)D	CP 863 (Fr. Canada)			

②		Character Attribute
0	(48)D	normal
1	(49)D	superscript
-1	(45 49)D	subscript

③		Print Quality
1	(49D)	DRAFT
2	(50D)	LETTER QUALITY

Code Interpreters, Character Generators and Fonts

A list of optional fonts, available on font cards is given in Appendix C.

* *The instructions for the installation and use of the optional font cards are given in Appendix D. Further information is available in the manuals supplied with the individual options.*

Two independent fonts, denominated PRIMARY FONT and SECONDARY FONT, are always active in the printer (see Chapter 7 - Command Codes). All their characteristics can be modified independently.

A further two primary and secondary fonts can also be accessed; these, however, can only be selected one at a time. The command codes "SI" and "SO" allow you to alternate between the currently active primary and secondary font (see Chapter 7 - Command Codes).

Code Interpreters, Character Generators and Fonts

Resident Character Generator Tables

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P	'	p	Ç	É	À					
01	⊙	•	1	1	A	Q	a	q	U	æ	I					
02	•	•	"	2	B	R	b	r	é	Æ	Ó					
03	•	•	#	3	C	S	c	s	à	ó	ú					
04	•	•	\$	4	D	T	d	t	â	ô	ñ					
05	•	•	§	5	E	U	e	u	ä	ö	ñ					
06	•	•	•	6	F	V	f	v	ä	ü	•					
07	•	•	•	7	G	W	g	w	ç	ü	•					
08	•	•	•	8	H	X	h	x	ë	y	z					
09	•	•	•	9	I	Y	i	y	ë	ö	•					
0A	•	•	•	:	J	Z	j	z	ë	ü	•					
0B	•	•	•	:	K	I	k	i	ç	•	•					
0C	•	•	•	:	L	\	l	•	ç	•	•					
0D	•	•	•	=	M	]	m	]	ç	•	•					
0E	•	•	•	>	N	•	n	•	ç	•	•					
0F	•	•	•	/	?	•	•	•	ç	•	•					

PC-8 INTERNATIONAL

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00				0	@	P	'	p					À	Á	Â	Ã
01			1	1	A	Q	a	q			À	Á	Â	Ã	Ä	Å
02			"	2	B	R	b	r			À	Á	Â	Ã	Ä	Å
03			#	3	C	S	c	s			È	É	Ê	Ë	Ì	Í
04			\$	4	D	T	d	t			È	É	Ê	Ë	Ì	Í
05			§	5	E	U	e	u			È	É	Ê	Ë	Ì	Í
06			•	6	F	V	f	v			È	É	Ê	Ë	Ì	Í
07			'	7	G	W	g	w			È	É	Ê	Ë	Ì	Í
08			(	8	H	X	h	x			È	É	Ê	Ë	Ì	Í
09			)	9	I	Y	i	y			È	É	Ê	Ë	Ì	Í
0A			*	:	J	Z	j	z			È	É	Ê	Ë	Ì	Í
0B			•	:	K	I	k	i			È	É	Ê	Ë	Ì	Í
0C			,	<	L	\	l	•			È	É	Ê	Ë	Ì	Í
0D			•	=	M	]	m	]			È	É	Ê	Ë	Ì	Í
0E			•	>	N	•	n	•			È	É	Ê	Ë	Ì	Í
0F			/	?	•	•	•	•			È	É	Ê	Ë	Ì	Í

ROMAN-8

Code Interpreters, Character Generators and Fonts

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P	'	p	Ç	É	À		Ł	À	ó	≡
01	©	•	!	1	A	Q	a	q	ú	æ	ı		ı	•	ß	ı
02	•	•	"	2	B	R	b	r	é	Æ	ó		ı	ı	ı	ı
03	♥		#	3	C	S	c	s	ä	ö	ü	ı	ı	ı	ı	ı
04	•	•	\$	4	D	T	d	t	ä	ö	ñ	ı	ı	ı	ı	ı
05	•	•	§	5	E	U	e	u	ä	ö	ñ	ı	ı	ı	ı	ı
06	•	•	&	6	F	V	f	v	ä	ö	ñ	ı	ı	ı	ı	ı
07	•	•	'	7	G	W	g	w	ç	ü	ö	ı	ı	ı	ı	ı
08	■	↑	(	8	H	X	h	x	ë	y	z	ı	ı	ı	ı	ı
09	•	↓	)	9	I	Y	i	y	ë	ö	ä	ı	ı	ı	ı	ı
0A	■	→	*	:	J	Z	j	z	ë	ü	Ä	ı	ı	ı	ı	ı
0B	•	←	+	;	K	I	k	i	ı	ö	ē	ı	ı	ı	ı	ı
0C	•	ı	,	<	L	\	l	:	ı	E	n	ı	ı	ı	ı	ı
0D	ı	•	-	=	M	J	m	j	ı	ö	ı	ı	ı	ı	ı	ı
0E	ı	•	.	>	N		n	~	Ä	L	ı	ı	ı	ı	ı	ı
0F	ı	•	/	?	O		o	•	Ä	ı	ı	ı	ı	ı	ı	ı

PC-8 DENMARK / NORWAY

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00				0	@	P	'	p				0	@	P	'	p
01			!	1	A	Q	a	q			!	1	A	Q	a	q
02			"	2	B	R	b	r			"	2	B	R	b	r
03			#	3	C	S	c	s			#	3	C	S	c	s
04			\$	4	D	T	d	t			\$	4	D	T	d	t
05			%	5	E	U	e	u			%	5	E	U	e	u
06			&	6	F	V	f	v			&	6	F	V	f	v
07			'	7	G	W	g	w			'	7	G	W	g	w
08			(	8	H	X	h	x			(	8	H	X	h	x
09			)	9	I	Y	i	y			)	9	I	Y	i	y
0A			*	:	J	Z	j	z			*	:	J	Z	j	z
0B			+	;	K	I	k	ı			+	;	K	I	k	ı
0C			,	<	L	\	l	:			,	<	L	\	l	:
0D			-	=	M	J	m	ı			-	=	M	J	m	ı
0E			.	>	N		n	~			.	>	N		n	~
0F			/	?	O		o	•			/	?	O		o	•

LEGAL

Code Interpreters, Character Generators and Fonts

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0	
00				0	@	P	'	p					•	À	Ð	à	ð
01			1	1	A	Q	a	q			ı	±	Á	Ñ	á	ñ	
02			"	2	B	R	b	r			ç	²	Â	Ò	â	ò	
03			#	3	C	S	c	s			€	³	Ã	Ó	ã	ó	
04			\$	4	D	T	d	t			¤	ˆ	Ä	Ô	ä	ô	
05			%	5	E	U	e	u			¥	µ	Å	Ö	å	ö	
06			&	6	F	V	f	v			¦	¶	Æ	Ø	æ	ø	
07			'	7	G	W	g	w			§	·	Ç	×	ç	÷	
08			(	8	H	X	h	x			¨	¸	È	Ø	è	ø	
09			)	9	I	Y	i	y			©	¹	É	Ù	é	ù	
0A			*	:	J	Z	j	z			ª	º	Ê	Ú	ê	û	
0B			+	;	K	[	k	{			«	»	Ë	Û	ë	ü	
0C			,	<	L	\	l				¬	¼	Ì	Ü	ì	ü	
0D			-	=	M	]	m	}				½	Í	Ý	í	ý	
0E			.	>	N	^	n	~			®	¾	Î	Þ	î	þ	
0F			/	?	O	_	o				¯	¿	Ï	ß	ï	ÿ	

ECMA-94 (ISO 8859/1)

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P	'	p	Ç	É		•	À	L	à	ı
01	☉	•	ı	1	À	Q	a	q	U	æ	ı	±	Á	Ñ	á	ñ
02	●	±	"	2	B	R	b	r	é	Æ	ç	²	Â	Ò	â	ò
03	♥	ıı	#	3	C	S	c	s	ä	ö	€	³	Ã	Ó	ã	ó
04	♦	¶	\$	4	D	T	d	t	å	õ		ˆ	Ä	Ô	ä	ô
05	✦	§	%	5	E	U	e	u	ä	ö	¥	µ	Å	Ö	å	ö
06	●	-	&	6	F	V	f	v	å	ü		¶	Æ	Ø	æ	ø
07	•	±	'	7	G	W	g	w	ç	ù	§	·	Ç	Ø	ç	œ
08	■	†	(	8	H	X	h	x	ê	ý	¤		È	Ø	è	ø
09	◦	↓	)	9	I	Y	i	y	ë	ö	©	¹	É	Ù	é	ù
0A	■	+	*	:	J	Z	j	z	ê	ü	ª	º	Ê	Ú	ê	û
0B	◊	•	+	;	K	[	k	{	ı	ç	«	»	Ë	Û	ë	ü
0C	♀	ˆ	,	<	L	\	l		ı	€	¬	¼	Ì	Ü	ì	ü
0D	♪	⊕	-	=	M	]	m	}	ı	¥		½	Í	Ý	í	ý
0E	♪	•	.	>	N	^	n	~	À	Æ		¾	Î	Þ	î	
0F	◊	•	/	?	O	_	o		À	f		¿	Ï	ß	ï	

UNIX INTERNATIONAL

Code Interpreters, Character Generators and Fonts

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00																
10																
20		!	"	□	□	%	&	'	(	)	*	+	,	-	.	/
30	O	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	□	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	□	□	□	□	-
60	□	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	□	□	□	□	■

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
ISO 2	#	α	@	[	\	]	-	·	{		}	—
ISO 4	£	§	@	[	\	]	-	·	{		}	—
ISO 6	#	§	@	[	\	]	^	·	{		}	~
ISO 10	#	α	@	Ä	Ö	Å	-	·	ä	ö	å	—
ISO 11	#	α	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ISO 14	#	§	@	[	¥	]	^	·	{		}	—
ISO 15	£	§	§	°	ç	é	·	ù	à	ò	è	ì
ISO 16	#	§	§	Ä	Ç	Ö	-	·	ä	ç	ö	°
ISO 17	£	§	§	ì	Ñ	¿	-	·	°	ñ	ç	~
ISO 21	#	§	§	Ä	Ö	Ü	-	·	ä	ö	ü	ß
ISO 60	#	§	@	Æ	Ø	Å	-	·	æ	ø	å	—
ISO 61	§	§	@	Æ	Ø	Å	-	·	æ	ø	å	
ISO 69	£	§	à	°	ç	§	-	μ	é	ù	è	..

ISO CODES

Code Interpreters, Character Generators and Fonts

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P	'	p	Ç	É	á		¿	ó	ó	-
01	©	•	!	1	A	Q	a	q	u	æ	í		±	Ð	ß	±
02	•	•	"	2	B	R	b	r	é	æ	ó		±	É	ó	-
03	•		#	3	C	S	c	s	á	ó	ú		±	É	ó	•
04	•	•	\$	4	D	T	d	t	á	ó	ñ	±	-	É	ó	•
05	•	•	%	5	E	U	e	u	á	ó	N	±	±	í	ó	\$
06	•	-	•	6	F	V	f	v	Á	ú	•	±	±	í	µ	•
07	•	±	'	7	G	W	g	w	ç	ú	•	±	±	í	p	•
08	•	±	(	8	H	X	h	x	é	y	z	•	±	í	p	•
09	•	±	)	9	I	Y	i	y	é	ó	•	±	±	í	o	•
0A	•	±	*	:	J	Z	j	z	é	ú	•	±	±	í	o	•
0B	•	±	+	;	K	I	k	i	í	•	±	±	±	í	o	•
0C	•	±	,	<	L	\	l	í	í	•	±	±	±	í	y	•
0D	•	±	-	=	M	I	m	í	í	•	±	±	±	í	y	•
0E	•	±	.	>	N	•	n	•	Á	x	•	±	±	í	•	•
0F	•	±	/	?	O	•	o	•	Á	f	•	±	±	í	•	•

CP 850

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P	'	p	Ç	É	á		¿	á	α	=
01	©	•	!	1	A	Q	a	q	u	Á	í		±	±	β	±
02	•	•	"	2	B	R	b	r	é	É	ó		±	±	Γ	±
03	•		#	3	C	S	c	s	á	ó	ú		±	±	n	±
04	•	•	\$	4	D	T	d	t	á	ó	ñ	±	-	±	Σ	±
05	•	•	%	5	E	U	e	u	á	ó	N	±	±	±	o	J
06	•	-	•	6	F	V	f	v	Á	ú	•	±	±	±	µ	•
07	•	±	'	7	G	W	g	w	ç	ú	•	±	±	±	τ	•
08	•	±	(	8	H	X	h	x	é	í	z	•	±	±	φ	•
09	•	±	)	9	I	Y	i	y	É	ó	ó	±	±	±	θ	•
0A	•	±	*	:	J	Z	j	z	é	ú	•	±	±	±	o	•
0B	•	±	+	;	K	I	k	i	í	•	±	±	±	±	ó	•
0C	•	±	,	<	L	\	l	í	í	•	±	±	±	±	∞	•
0D	•	±	-	=	M	I	m	í	í	•	±	±	±	±	σ	•
0E	•	±	.	>	N	•	n	•	Á	h	•	±	±	±	ε	•
0F	•	±	/	?	O	•	o	•	Á	ó	•	±	±	±	π	•

CP 860 (PORTUGAL)

Code Interpreters, Character Generators and Fonts

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	ø	P		p	ç	é	á		l	ä	α	≡
01	⊙	•	!	1	A	Q	a	q	ü	æ	í		±	τ	β	±
02	●	±	"	2	B	R	b	r	ë	æ	ó		τ	τ	Γ	≥
03	♥		#	3	C	S	c	s	ä	ö	ü		†	ä	n	≤
04	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	†	-	l	Σ	Γ
05	◆	§	¥	5	E	U	e	u	ä	ö	Ñ	†	†	r	σ	J
06	◆	-	¢	6	F	V	f	v	ä	ü	ö	†	†	r	μ	÷
07	•	±	'	7	G	W	g	w	ç	ü	Ö	†	†	†	τ	=
08	■	†	(	8	H	X	h	x	ë	y	z	†	†	†	•	•
09	◊	↓	)	9	I	Y	i	y	ë	Ö	ä	†	†	†	•	•
0A	■	→	*	:	J	Z	j	z	ë	Ü	Ä		†	†	Q	•
0B	♂	←	+	;	K	[	k	{	Y	o	ℓ	†	†	■	ö	√
0C	♀	←	,	<	L	\	l	;	i	ℓ	n	†	†	■	∞	n
0D	†	↔	-	=	M	]	m	}	i	ø	;	†	-	■	•	•
0E	♂	←	.	>	N	^	n	~	Ä	L	;	†	†	■	•	•
0F	◊	•	/	?	O	~	o	o	Ä	I	z	†	†	■	n	

DENMARK OPE 1

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	ø	P		p	ç	é	á		l	ä	α	≡
01	⊙	•	!	1	A	Q	a	q	ü	æ	í		±	τ	β	±
02	●	±	"	2	B	R	b	r	ë	æ	ó		τ	τ	Γ	≥
03	♥		#	3	C	S	c	s	ä	ö	ü		†	ä	n	≤
04	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	†	-	l	Σ	Γ
05	◆	§	¥	5	E	U	e	u	ä	ö	Ñ	†	†	r	σ	J
06	◆	-	¢	6	F	V	f	v	ä	ü	ö	†	†	r	μ	÷
07	•	±	'	7	G	W	g	w	ç	ü	Ö	†	†	†	τ	=
08	■	†	(	8	H	X	h	x	ë	y	z	†	†	†	•	•
09	◊	↓	)	9	I	Y	i	y	ë	Ö	ä	†	†	†	•	•
0A	■	→	*	:	J	Z	j	z	ë	Ü	Ä		†	†	Q	•
0B	♂	←	+	;	K	Æ	k	æ	Y	o	ℓ	†	†	■	ö	√
0C	♀	←	,	<	L	Ø	l	ø	i	ℓ	n	†	†	■	∞	n
0D	†	↔	-	=	M	Ä	m	ä	i	ø	;	†	-	■	•	•
0E	♂	←	.	>	N	^	n	~	Ä	L	;	†	†	■	•	•
0F	◊	•	/	?	O	~	o	o	Ä	I	z	†	†	■	n	

DENMARK OPE 2

Code Interpreters, Character Generators and Fonts

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P		p	Ç	E	â		l	â	α	≡
01	©	◄	l	1	A	Q	a	q	ü	ï	ï		±	τ	β	±
02	•	±	"	2	B	R	b	r	é	ó	ó		τ	τ	Γ	≥
03	♥		#	3	C	S	c	s	â	ô	ü		†	â	π	≤
04	•	¶	\$	4	D	T	d	t	â	ö	ñ	†	~	â	Σ	∫
05	•	§	¥	5	E	U	e	u	â	ö	ñ	†	†	†	σ	∫
06	•	-	â	6	F	V	f	v	â	ü	•	†	†	†	μ	±
07	•	±	'	7	G	W	g	w	ç	ü	"	†	†	†	τ	=
08	■	†	(	8	H	X	h	x	é	â	é	†	â	†	•	•
09	◊	↓	)	9	I	Y	i	y	é	ö	l	†	†	†	•	•
0A	■	→	*	:	J	Z	j	z	é	ü	L		â	†	Q	•
0B	♂	←	+	;	K	I	k	{	Y	ö	½	†	†	■	ó	∇
0C	♀	↓	,	<	L	\	l	:	l	é	½	†	†	■	=	n
0D	†	◊	-	=	M	I	m	}	l	ü	;	†	~	■	•	?
0E	♂	→	.	>	N		n		â	ñ	«	†	†	■	ε	•
0F	α	▼	/	?	O		o	ó	ê	ÿ	»	†	†	■	π	

SPAIN 2

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00		•		0	@	P		p	Ç	Ê	:			l	â	α
01	©	◄	l	1	A	Q	a	q	ü	Ê		•		±	τ	β
02	•	±	"	2	B	R	b	r	é	Ê	ó		τ	τ	Γ	≥
03	♥		#	3	C	S	c	s	â	ô	ü		†	â	π	≤
04	•	¶	\$	4	D	T	d	t	â	ö		†	~	â	Σ	∫
05	•	§	¥	5	E	U	e	u	â	ÿ		†	†	†	σ	∫
06	•	-	â	6	F	V	f	v	ü	•		†	†	†	μ	±
07	•	±	'	7	G	W	g	w	ç	ü		†	†	†	τ	=
08	■	†	(	8	H	X	h	x	é	ü	ï	†	â	†	•	•
09	◊	↓	)	9	I	Y	i	y	é	ö	~	†	†	†	•	•
0A	■	→	*	:	J	Z	j	z	é	ü	~		â	†	Q	•
0B	♂	←	+	;	K	I	k	{	Y	ö	½	†	†	■	ó	∇
0C	♀	↓	,	<	L	\	l	:	l	é	½	†	†	■	=	n
0D	†	◊	-	=	M	I	m	}	=	ü	½	†	~	■	•	?
0E	♂	→	.	>	N		n		â	ö	«	†	†	■	ε	■
0F	α	▼	/	?	O		o	ó	§	f	»	†	†	■	π	

CP 863 (FRENCH CANADA)

Code Interpreters, Character Generators and Fonts

	0	1	2	3	4	5	6	7
0			+	+	+	+	+	+
1		+	+	+	+	+	+	+
2		+	+	+	+	+	+	+
3		+	+	+	+	+	+	+
4		+	+	+	+	+	+	+
5		+	+	+	+	+	+	+
6		+	+	+	+	+	+	+
7		+	+	+	+	+	+	+
8		+	+	+	+	+	+	+
9		+	+	+	+	+	+	+
A		+	+	+	+	+	+	+
B		+	+	+	+	+	+	+
C		+	+	+	+	+	+	+
D		+	+	+	+	+	+	+
E		+	+	+	+	+	+	+
F		+	+	+	+	+	+	+

Line Draw

Command Codes

Logic of the Printer Commands

When the printer is set for a particular emulation, it will interpret **ONLY** the set of commands belonging to that emulation.

Brief Introduction to Commands

A printer command consists typically of one or more characters imbedded in the flow of data transmitted to the printer. To make the printer understand which characters are to be interpreted as commands and which as printable characters, there is a simple built-in convention: all "characters" that have, according to the character table, a decimal value less than 32 are interpreted as control codes. Some of them result in an action, when they are received, others do not. The ones causing printer action can be found in the command code description. There is also a special command ESCAPE (decimal code 27, named ESC) which is used by most printer emulations to open a command sequence. It is followed by one or more additional characters, which are identifiers and parameters, belonging to the printable characters or to those from the range of control codes.

 *If your printer receives commands which are not compatible with the emulation in use, it may ignore some of the commands, or print as characters the additional data following certain unknown ESCape sequences, or even, in the worst case, block. Whatever happens, no serious harm will be done to your printer. To clear the situation, just switch it off and on again.*

Use of Control Codes

When you program, you will have to insert the desired control codes in the program code. Some general points should be kept in mind when implementing them:

- As Control Codes are generally not regarded as printable data, they do not take up space in the final output. E.g.: the print out of a data string of 150 characters, of which 80 are control codes, will result in the printing of 70 characters and may well stay in one line.
- **Do not insert spaces within a control sequence nor between the sequence and the printable data! The command code descriptions contain spaces only for the purpose of legibility.**
- Some commands are valid only for one line (until next carriage return), others, until they are switched off. See the specific code descriptions.

Command Codes

- File format in MS-DOS closes each line with a CR+LF pair. Unix and similar systems use only an LF. The default setting of the printer for "new line" creation will thus work correctly for MS-DOS, but has to be [LF = LF+CR; CR = CR] in UNIX environment. Adjust the parameter setting during printer SET-UP (Chapter 4 - Printer Programming), if necessary.
- Using the reset command anywhere within the application cancels ALL settings executed by the software and returns to the default settings as programmed in printer SET-UP and memorized in the printer.
- A few of the commands have a built-in order of priority with respect to others, or within their own functional group. See the command code description for details.

Creation of Control Codes

There are several ways of inserting your control codes in a program. The procedure used will depend on the programming language you are using, its editor or your word processor. Some environments are fairly "transparent", which means that they allow you to display many of the codes below 32 as a symbol on your screen. Others are less so, and require one of the methods described below.

Within the program code you will often use the decimal value of a character or its hexadecimal value; sometimes even the character itself.

Some environments allow you to create the ESCape code symbol by pressing the ESCape key. This is normally the only code you can create with one keystroke. You can also create it using either of the following methods. Both methods can also be applied for all codes between 1 and 32:

1. Press the control key **CTRL** and the key [simultaneously. The symbol displayed, which may vary depending on the software application in use, stands for ESCape (^[) or <-- .
2. Hold down the **ALT** key, while you insert from the numeric keypad (right hand side of keyboard) one digit after the other the character code, in this case 2 and 7 (= 27). Releasing the **ALT** key will display the character symbol on your display: the left arrow (<--).

***** *There is no general rule on how to insert control codes. You must be familiar with your operating system and your application to know which method to use.*

You can also use the method with **ALT** + numeric code to display all the characters of your PC character table, which otherwise you cannot access directly with the keyboard.

Command Codes



Attempts to create or visualize all the possible codes may cause your system to block, with the need to re-initialize it, as there is no completely transparent environment!

Table of Standard Control Codes

The following table shows the codes below 32 with their names, values and possible ways of creation. The ones widely used with printers are indicated by an <-:

Symbol Name	Decimal value	CTRL+KEY	ALT+Number
SOH	01	^A	ALT 1
STX	02	^B	ALT 2
ETX	03	^C	ALT 3
EOT	04	^D	ALT 4
ENQ	05	^E	ALT 5
ACK	06	^F	ALT 6
BEL	07	^G	ALT 7
BS	08	^H	ALT 8 <-
HT	09	^I	ALT 9 <-
LF	10	^J	ALT 10 <-
VT	11	^K	ALT 11
FF	12	^L	ALT 12 <-
CR	13	^M	ALT 13 <-
SO	14	^N	ALT 14 <-
SI	15	^O	ALT 15 <-
DLE	16	^P	ALT 16
DC1	17	^Q	ALT 17 <-
DC2	18	^R	ALT 18
DC3	19	^S	ALT 19 <-
DC4	20	^T	ALT 20
NAK	21	^U	ALT 21
SYN	22	^V	ALT 22
ETB	23	^W	ALT 23
CAN	24	^X	ALT 24
EM	25	^Y	ALT 25
SUB	26	^Z	ALT 26
ESC	27	^[	ALT 27 <-
FS	28	^\ ^	ALT 28
GS	29	^]	ALT 29
RS	30	^^	ALT 30
US	31	^_	ALT 31

Command Codes

Multiple ESCape Sequences

If the consecutive ESCape sequences you send to the printer have the same two characters after the character ESC, you can save time by sending a single multiple ESC sequence. This multiple sequence will consist of the ESC character, the two common characters which follow ESC and the remaining characters of each command.

E.g.: if you have to send the sequences: ESC (s 3 B, ESC (s 3 T and ESC (s 1 Q, you can do so using the following multiple sequence:

ESC (s 3 b 3 t 1 Q

Note that the last character of the first two sequences "B" and "T" have become lower case ("b" and "t" respectively), while the last character of the last sequence ("Q") has remained uppercase (indicating, thus, the end of the multiple sequence).

FONT Selection Order of Priority

The font selection **MUST ALWAYS** be indicated in the following order:

1. Print orientation (PORTRAIT or LANDSCAPE)
2. Character set (PC-8, etc.)
3. Character position on the print line (normal, superscript, subscript)
4. Spacing (fixed or proportional)
5. Print pitch
6. Character height (dots)
7. Style (upright or italic)
8. Stroke weight (medium or bold)
9. Typeface (Courier, etc.)
10. Print quality (DRAFT, LQ, HSD)

Bear this order in mind when send the ESCape sequences for the various parameters, to avoid any surprises.

The Commands

The command codes described in this chapter constitute the complete set of commands for the resident HP DeskJet PLUS emulation, plus a subset of specific commands, for additional features, which do not belong to the HP DeskJet PLUS command set.

The chapter is organized in two sections:

1. **Quick reference table**

Lists all the commands, grouped according to their functions, indicating the page on which you will find more detailed information.

2. **Command code description**

Contains a detailed description of the commands, in the order indicated in the quick reference table.

In the Command Description section, the following code notation is used:

- **A = (65)D = (41)H**, indicating an ASCII character (A), its decimal code (65)D and its hexadecimal code (41)H.
- the symbol "*n*" (or "*n*₁, *n*₂, .."), used in italics with the main code, indicating a variable parameter which has to be calculated to give the value required (usually the decimal value of the character).
- two dots (..) within the code description, indicating that the character they represent varies according to the definition of the command parameter "*n*".

Some features are enabled and disabled using codes SOH (1)D and NUL (0)D in the variable byte of the Escape Sequence. Where indicated, the codes "1" (49)D and "0" (48)D respectively can be used for the same purpose. This simplifies their use within a text.

 **Remember that the control sequences must be used WITHOUT spacing between the component characters (spaces have been added in the code descriptions ONLY to simplify the identification of the component parts).**

Command Codes

Quick Reference Table

BASIC OPERATIONS

BS	8	08	Backspace	7-9
HT	9	09	Horizontal Tabulation	7-9
LF	10	0A	Line Feed	7-9
FF	12	0C	Form Feed	7-9
CR	13	0D	Carriage Return	7-9
SO	14	0E	Activates Secondary Font	7-10
SI	15	0F	Activates Primary Font	7-10
SP	32	20	Space	7-10
DEL	127	7F	Delete (ignored)	7-10

FONTS AND CHARACTER SETS

ESC (n @	27 40 n 64	1B 28 n 40	Primary Font	7-11
ESC (0 @	27 40 48 64	1B 28 30 40	Default Primary Character Set	7-11
ESC (2 @	27 40 50 64	1B 28 32 40	Current Primary Character Set	7-11
ESC (3 @	27 40 51 64	1B 28 33 40	Default Primary Font	7-11
ESC) n @	27 41 n 64	1B 29 n 40	Secondary Font	7-11
ESC) 0 @	27 41 48 64	1B 29 30 40	Default Secondary Character Set	7-11
ESC) 1 @	27 41 49 64	1B 29 31 40	Default Primary Character Set	7-11
ESC) 2 @	27 41 50 64	1B 29 32 40	Current Primary Character Set	7-12
ESC) 3 @	27 41 51 64	1B 29 33 40	Default Secondary Font	7-12
ESC & 1 0 O	27 38 108 48 79	1B 26 6C 30 4F	PORTRAIT Print Orientation	7-12
ESC & 1 1 O	27 38 108 49 79	1B 26 6C 31 4F	LANDSCAPE Print Orientation	7-12
ESC (n m	27 40 n m	1B 28 n m	Primary Character Set Definition	7-13
ESC) n m	27 41 n m	1B 29 n m	Secondary Character Set Definition	7-13

PRINT ATTRIBUTES

ESC (s + 1 U	27 40 115 43	1B 28 73 30 2B	Superscripts	7-15
	49 85	31 55		
ESC (s - 1 U	27 40 115 45	1B 28 73 30 2D	Subscripts	7-15
	49 85	31 55		
ESC (s 0 U	27 40 115 48 85	1B 28 73 30 55	Clears Superscripts/Subscripts	7-15
ESC (s 0 P	27 40 115 48 80	1B 28 73 30 50	Selects Fixed Horizontal Spacing	7-15
ESC (s 1 P	27 40 115 49 80	1B 28 73 31 50	Selects Proportional Horizontal Spacing	7-16
ESC (s n H	27 40 115 n 72	1B 28 73 n 48	Fixed Horizontal Pitch	7-16
ESC (s n V	27 40 115 n 86	1B 28 73 n 56	Character Height	7-16

Command Codes

ESC (s 0 S	27 40 115 48 83	1B 28 73 30 53	Upright Print Style	7-16
ESC (s 1 S	27 40 115 49 83	1B 28 73 31 53	Italic Print Style	7-17
ESC (s 0 B	27 40 115 48 66	1B 28 73 30 42	Medium Stroke Intensity	7-17
ESC (s 3 B	27 40 115 51 66	1B 28 73 33 42	Bold Stroke Intensity	7-17
ESC (s 7 B	27 40 115 55 66	1B 28 73 37 42	Bold Stroke Intensity	7-17
ESC (s n T	27 40 115 n 84	1B 28 73 n 54	Character Typeface	7-17
ESC (s 1 Q	27 40 115 49 81	1B 28 73 31 51	DRAFT Printing	7-18
ESC (s 2 Q	27 40 115 50 81	1B 28 73 32 51	LETTER QUALITY Printing	7-18
ESC (s 9 Q	27 40 115 57 81	1B 28 73 39 51	HIGH SPEED DRAFT Printing	7-18
ESC & d n D	27 38 100 n 68	1B 26 64 n 44	Underscore	7-19
ESC & d @	27 38 100 64	1B 26 64 40	Clears Underscore	7-19
ESC & k n E	27 38 107 n 69	1B 26 6B n 45	Underscore for One Line	7-19

PAGE FORMAT

ESC & 1 n A	27 38 108 n 65	1B 26 6C n 41	Paper Format	7-21
ESC & 1 n P	27 38 108 n 80	1B 26 6C n 50	Page Length	7-21
ESC & 1 n D	27 38 108 n 68	1B 26 6C n 44	Line Feed (in LPI)	7-21
ESC & 1 n C	27 38 108 n 67	1B 26 6C n 43	Line Feed (in n/48")	7-22
ESC =	27 61	1B 3D	Half Line Feed Forward	7-22
ESC & a n L	27 38 97 n 76	1B 26 61 n 4C	Left Margin	7-22
ESC & a n M	27 38 97 n 77	1B 26 61 n 4D	Right Margin	7-23
ESC 9	27 57	1B 39	Clears Left and Right Margins	7-23
ESC & 1 n E	27 38 108 n 69	1B 26 6C n 45	Top of Form (TOF)	7-23
ESC & 1 n F	27 38 108 n 70	1B 26 6C n 46	Print Area Length	7-24

VERTICAL POSITIONING OF CURSOR

ESC & a n R	27 38 97 n 82	1B 26 61 n 52	Positioning on Line "n"	7-25
ESC & a + n R	27 38 97 43 n 82	1B 26 61 2B n 52	Positioning "n" Lines Forward	7-25
ESC & a - n R	27 38 97 45 n 82	1B 26 61 2D n 52	Positioning "n" Lines Back	7-25
ESC * p n Y	27 42 112 n 89	1B 2A 70 n 59	Positioning on Dot "n"	7-25
ESC * p + n Y	27 42 112 43 n 89	1B 2A 70 2B n 59	Positioning "n" Dots Forward	7-25
ESC * p - n Y	27 42 112 45 n 89	1B 2A 70 2D n 59	Positioning "n" Dots Back	7-26
ESC & a n V	27 38 97 n 86	1B 26 61 n 56	Positioning on Decipoint "n"	7-26
ESC & a + n V	27 38 97 43 n 86	1B 26 61 2B n 56	Positioning "n" Decipoints Forward	7-26
ESC & a - n V	27 38 97 45 n 86	1B 26 61 2D n 56	Positioning "n" Decipoints Back	7-26

HORIZONTAL POSITIONING OF CURSOR

ESC & a n C	27 38 97 n 67	1B 26 61 n 43	Positioning First Print Position in Column "n"	7-27
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Command Codes

ESC & a + n C	27 38 97 43 n 67	1B 26 61 2B n 43	Positioning "n" Columns to the Right	7-27
ESC & a - n C	27 38 97 45 n 67	1B 26 61 2D n 43	Positioning "n" Columns to the Left	7-27
ESC * p n X	27 42 112 n 88	1B 2A 70 n 58	Positioning First Print Position on Dot "n"	7-27
ESC * p + n X	27 42 112 43 n 88	1B 2A 70 2B n 58	Positioning "n" Dots to the Right	7-27
ESC * p - n X	27 42 112 45 n 88	1B 2A 70 2D n 58	Positioning "n" Dots to the Left	7-28
ESC & a n H	27 38 97 n 72	1B 26 61 n 48	Positioning First Print Position on Decipoint "n"	7-28
ESC & a + n H	27 38 97 43 n 72	1B 26 61 2B n 48	Positioning "n" Decipoints to the Right	7-28
ESC & a - n H	27 38 97 45 n 72	1B 26 61 2D n 48	Positioning "n" Decipoints to the Left	7-28
ESC & k n H	27 38 107 n 72	1B 26 6B n 48	Horizontal Motion Index (HMI) n/120"	7-29

GRAPHIC MODE

ESC (* t n R	27 42 116 n 82	1B 2A 74 n 52	Graphic Resolution	7-30
ESC * r n S	27 42 114 n 83	1B 2A 72 n 53	Graphic Printing Width	7-30
ESC * b 0 M	27 42 98 48 77	1B 2A 62 30 4D	Normal Graphic Printing	7-31
ESC * b 1 M	27 42 98 49 77	1B 2A 62 31 4D	Compacted Mode 1	7-31
ESC * b 2 M	27 42 98 50 77	1B 2A 62 32 4D	Compacted Mode 2	7-32
ESC * r n Q	27 42 114 n 81	1B 2A 72 n 51	Graphic Printing Quality	7-33
ESC * r n A	27 42 114 n 65	1B 2A 72 n 41	Start Graphic Printing	7-33
ESC * b n W ..	27 42 98 n 87 ..	1B 2A 62 n 57 ..	Send Data for Graphic Printing	7-34
ESC * b n X	27 42 98 n 88	1B 2A 62 n 58	Horizontal (X) Offset	7-34
ESC * b n Y	27 42 98 n 89	1B 2A 62 n 59	Vertical (Y) Offset	7-34
ESC * r B	27 42 114 66	1B 2A 72 42	End Graphic Printing	7-35

OTHERS

ESC E	27 69	1B 45	Logical Reset	7-37
ESC z	27 122	1B 7A	Autodiagnostics	7-37
ESC Y	27 89	1B 59	Code Printing	7-37
ESC Z	27 90	1B 5A	Disables Code Printing	7-38
ESC & p n X ..	27 38 112 n 88 ..	1B 26 70 n 58 ..	Transparent Printing Mode	7-38
ESC & s n C	27 38 115 n 67	1B 26 73 n 43	Wrap Around	7-38
ESC & k n G	27 38 107 n 71	1B 26 6B n 47	Print Line Closure	7-39
ESC & k n F	27 38 107 n 70	1B 26 6B n 46	SO/SI enabled for One Line	7-39
ESC & k n W	27 38 107 n 87	1B 26 6B n 57	Print Direction	7-39
ESC & k n W	27 38 107 n 87	1B 26 6B n 57	Text Scaling	7-40
ESC & 1 0 H	27 38 108 48 72	1B 26 6C 30 48	Paper Expulsion	7-40
ESC & 1 1 H	27 38 108 49 72	1B 26 6C 31 48	Paper Feed from ASF1 (default)	7-40
ESC & 1 4 H	27 38 108 52 72	1B 26 6C 34 48	Paper Feed from ASF2	7-41
ESC & 1 9 H	27 38 108 57 72	1B 26 6C 39 48	Paper Feed from ASF2	7-41
ESC & 1 3 H	27 38 108 51 72	1B 26 6C 33 48	Manual Paper Feed (sheet/envelope)	7-41

Command Code Description

BASIC OPERATIONS

BS	Backspace
----	-----------

(8)D (08)H	Moves the present print position (cursor) one character space (currently selected pitch) to the left.
---------------	---

HT	Horizontal Tabulation
----	-----------------------

(9)D (09)H	Moves the print head to the next horizontal tabulation stop (default: one stop every eight characters, starting from the physical left hand margin).
---------------	--

LF	Line Feed
----	-----------

(10)D (0A)H	Advances the paper one line feed (value selected in printer SET-UP, or imposed with a command from host).
----------------	---

FF	Form Feed
----	-----------

(12)D (0C)D	With the paper tray (ASF1) selected and paper present, causes any pending data to be printed and then expels the paper.
----------------	---

CR	Carriage Return
----	-----------------

(13)D (0D)H	Returns the current print position to the beginning of the line (left hand margin).
----------------	---

Command Codes

SO	Activates Secondary Font
-----------	---------------------------------

(14)D (0E)H	Selects the secondary font as the current font (see FONTS).
----------------	---

Remains active until command code SI is received, or only for the current print line, if command code ESC & k n F has been sent..

SI	Activates Primary Font
-----------	-------------------------------

(15)D (0F)H	Selects the primary font as the current font (see FONTS).
----------------	---

Remains active until command code SO is received, or only for the current print line, if command code ESC & k n F has been sent.

SP	Space
-----------	--------------

(32)D (20)H	Moves the present print position (cursor) one character space (currently selected pitch) to the right.
----------------	--

DEL	Delete
------------	---------------

(127)D (7F)H	Ignored.
-----------------	----------

Command Codes

FONTS AND CHARACTER SETS

ESC (<i>n</i> @	Primary Font
------------------	--------------

(27 40 <i>n</i> 64)D (1B 28 <i>n</i> 40)H	Selects the primary font (that normally used), according to the value of " <i>n</i> ".
--	--

ESC (0 @	Default Primary Character Set
-----------	-------------------------------

(27 40 48 64)D (1B 28 30 40)H	Selects the default primary character set (that defined in printer SET-UP).
----------------------------------	---

ESC (2 @	Current Primary Character Set
-----------	-------------------------------

(27 40 50 64)D (1B 28 32 40)H	Selects the current primary character set .
----------------------------------	---

ESC (3 @	Default Primary Font
-----------	----------------------

(27 40 51 64)D (1B 28 33 40)H	Selects the default primary font (that defined in ON-LINE operating status).
----------------------------------	--

ESC) <i>n</i> @	Secondary Font
------------------	----------------

(27 41 <i>n</i> 64)D (1B 29 <i>n</i> 40)H	Selects the secondary font, according to the value of " <i>n</i> ".
--	---

ESC) 0 @	Default Secondary Character Set
-----------	---------------------------------

(27 41 48 64)D (1B 29 30 40)H	
----------------------------------	--

ESC) 1 @	Default Primary Character Set
-----------	-------------------------------

(27 41 49 64)D (1B 29 31 40)H	
----------------------------------	--

Command Codes

ESC) 2 @

Current Primary Character Set

(27 41 50 64)D
(1B 29 32 40)H

ESC) 3 @

Default Secondary Font

(27 41 51 64)D
(1B 29 33 40)H

ESC & 10 O

PORTRAIT Print Orientation

(27 38 108 48 79)D
(1B 26 6C 30 4F)H

Prints alphanumeric texts across the width of the page.

abcdefg hijklmno pqrstuv wxyz. 123456 7890

This is the default print orientation.

ESC & 11 O

LANDSCAPE Print Orientation

(27 38 108 49 79)D
(1B 26 6C 31 4F)H

Prints alphanumeric texts along the length of the page.

abcdefghijklmn opqrstuvwxyz. 1234567890.
--

This print orientation can also be selected in ON-LINE operating status.

Command Codes

ESC (*n m* Primary Character Set Definition

(27 40 *n m*)D
(1B 28 *n m*)H

Defines the character set to be used as the primary character set, according to the values of parameters "*n*" and "*m*".

Table 1 contains the resident character sets; table 2 contains the optional character sets.

The primary character set can also be defined in printer SET-UP.

ESC) *n m* Secondary Character Set Definition

(27 41 *n m*)D
(1B 29 *n m*)H

See ESC (*n m*.

Each ESC (sequence (primary character set) has a corresponding ESC) sequence for the secondary character set.

Table 1

Character Set	Commands		Decimal	Hexadecimal
Roman8	ESC (8 U	ESC) 8 U	56 85	38 55
PC-8	ESC (10 U	ESC) 10 U	49 48 85	31 30 55
PC-8 Denmark/Norway	ESC (11 U	ESC) 11 U	49 49 85	31 31 55
ECMA-94 Latin 1	ESC (0 N	ESC) 0 N	48 78	30 4E
ISO United Kingdom (04)	ESC (1 E	ESC) 1 E	49 69	31 45
ISO Germany (21)	ESC (1 G	ESC) 1 G	49 71	31 47
ISO France (69)	ESC (1 F	ESC) 1 F	49 70	31 46
ISO Italy (15)	ESC (0 I	ESC) 0 I	48 73	30 49
ISO Norway v. 1 (60)	ESC (0 D	ESC) 0 D	48 68	30 44
ISO Norway v. 2 (61)	ESC (1 D	ESC) 1 D	49 68	31 44
ISO Sweden: Names (11)	ESC (0 S	ESC) 0 S	48 83	30 53
ISO Sweden (10)	ESC (3 S	ESC) 3 S	51 83	33 53
ISO Spain (17)	ESC (2 S	ESC) 2 S	50 83	32 53
ASCII (06)	ESC (0 U	ESC) 0 U	48 85	30 55
ISO IRV (02)	ESC (2 U	ESC) 2 U	50 85	32 55
ISO Portugal (16)	ESC (4 S	ESC) 4 S	52 83	34 53
JIS ASCII (14)	ESC (0 K	ESC) 0 K	48 75	30 4B

Command Codes

Legal	ESC (1 U	ESC) 1 U	49 85	31 55
UNIX International	ESC (13 U	ESC) 13 U	49 51 85	31 33 55
CP 850	ESC (12 U	ESC) 12 U	49 50 85	31 32 55
CP 860 (Portugal)	ESC (33 I	ESC) 33 I	51 51 73	33 33 49
Denmark OPE 1	ESC (35 P	ESC) 35 P	51 53 80	33 35 50
Denmark OPE 2	ESC (34 P	ESC) 34 P	51 52 80	33 34 50
Spain 2	ESC (33 P	ESC) 33 P	51 51 80	33 33 50
CP 863 (French Canada)	ESC (34 I	ESC) 34 I	51 52 73	33 34 49

Table 2

Character Set	Commands		Decimal	Hexadecimal
Math7	ESC (0 M	ESC) 0 M	48 77	30 4D
Math8a	ESC (0 Q	ESC) 0 Q	48 81	30 51
Math8b	ESC (1 Q	ESC) 1 Q	49 81	31 51
Math8	ESC (8 M	ESC) 8 M	56 77	38 4D
Pi Font	ESC (15 U	ESC) 15 U	49 53 85	31 35 55
Pi Fonta	ESC (2 Q	ESC) 2 Q	50 81	32 51

Command Codes

PRINT ATTRIBUTES

ESC (s + 1 U

Superscripts

(27 40 115 43 49 85)D
(1B 28 73 30 2B 31 55)H

Selects superscript printing (characters positioned above the standard print line).

Example: $x^2 y^3$

This command does **not** affect the character height, which must be varied by sending the command code ESC (s n V before this command (see specific code description).

ESC (s - 1 U

Subscripts

(27 40 115 45 49 85)D
(1B 28 73 30 2D 31 55)H

Selects subscript printing (characters positioned below the standard print line).

Example: H₂ O

This command does **not** affect the character height, which must be varied by sending the command code ESC (s n V before this command (see specific code description).

ESC (s 0 U

Clears Superscripts/Subscripts

(27 40 115 48 85)D
(1B 28 73 30 55)H

Clears superscript/subscript printing, restoring normal printing mode.

ESC (s 0 P

Selects Fixed Horizontal Spacing

(27 40 115 48 80)D
(1B 28 73 30 50)H

All characters are printed with fixed horizontal spacing.

The print pitch is selected using command code ESC (s n H.

Command Codes

ESC (s 1 P

Selects Proportional Horizontal Spacing

(27 40 115 49 80)D
(1B 28 73 31 50)H

Each character is printed with a horizontal spacing proportional to its width (e.g. the horizontal spacing occupied by the character "i" will be considerably less than that occupied by the character "W").

ESC (s n H

Fixed Horizontal Pitch

(27 40 115 n 72)D
(1B 28 73 n 48)H

Selects the print pitch indicated by the value of "n".

The following resident pitches are available: 5, 10, 16.67, 20 cpi (other pitches are available with the optional fonts).

If you select a non-resident or non-installed print pitch, the printer will default to the nearest higher density print pitch available.

ESC (s n V

Character Height

(27 40 115 n 86)D
(1B 28 73 n 56)H

Selects the character height indicated by the value of "n".

The character height refers to the uppercase letters and is expressed in dots (one dot = 1/72 in - 0.3528 mm).

The following resident character heights are available: 6, 12 and 24 dots (other character heights are available with the optional fonts).

If you select a non-resident or non-installed character height, the printer will default to the nearest character height available.

ESC (s 0 S

Upright Print Style

(27 40 115 43 83)D
(1B 28 73 30 53)H

All the characters are printed in upright style.

Command Codes

ESC (s 1 S

Italic Print Style

(27 40 115 49 83)D
(1B 28 73 31 53)H

All the characters are printed in italic style.

ESC (s 0 B

Medium Stroke Intensity

(27 40 115 48 66)D
(1B 28 73 30 42)H

All the characters are printed with medium (normal) stroke intensity.

ESC (s 3 B

Bold Stroke Intensity

(27 40 115 51 66)D
(1B 28 73 33 42)H

Sets boldface printing until cleared by command code ESC (s 0 B which restores normal printing.

ESC (s 7 B

Bold Stroke Intensity

(27 40 115 55 66)D
(1B 28 73 37 42)H

Sets boldface printing until cleared by command code ESC (s 0 B which restores normal printing.

ESC (s n T

Character Typeface

(27 40 115 n 84)D
(1B 28 73 n 54)H

Defines the typeface with which the characters will be printed, according the value of parameter "n" indicated in the following table:

n	Typeface
3	Courier (resident)
4	Helv (Nordic) (optional)
5	TmsRmn (Times Nordic) (resident)
6	Letter Gothic (resident)
8	Prestige (optional)
11	Presentations (Information) (optional)

Command Codes

ESC (s 1 Q

DRAFT Printing

(27 40 115 49 81)D
(1B 28 73 31 51)H

Selects DRAFT printing with a speed of 240 cps.

This attribute can also be selected in ON-LINE operating status.

DRAFT printing gives less contrast, but saves ink.

ESC (s 2 Q

LETTER QUALITY Printing

(27 40 115 50 81)D
(1B 28 73 32 51)H

Selects LETTER QUALITY printing with a speed of 120 cps.

This attribute can also be selected in ON-LINE operating status.

LETTER QUALITY printing gives the maximum print quality available.

ESC (s 9 Q

HIGH SPEED DRAFT Printing

(27 40 115 57 81)D
(1B 28 73 39 51)H

Selects HIGH SPEED DRAFT printing with a speed of 360 cps.

This attribute can also be selected in ON-LINE operating status.

HIGH SPEED DRAFT printing gives the maximum print speed with minimum ink consumption available.

ESC & d n D**Underscore**

(27 38 100 n 68)D
(1B 26 64 n 44)H

Selects the type of underscore desired, according to the value of parameter "n":

n	Type
0	fixed single (default)
1	fixed single (independent of font)
2	fixed double (independent of font)
3	variable single (depending on font)
4	variable double (depending on font)

* *The fixed underscore is always in the same vertical position, regardless of the font used.*

The vertical position of the variable underscore will depend on the font used.

ESC & d @**Clears Underscore**

(27 38 100 64)D
(1B 26 64 40)H

Clears the underscore set using command code ESC & d n D.

ESC & k n E**Underscore for One Line**

(27 38 107 n 69)D
(1B 26 6B n 45)H

Enables/disables underscore for a single line, according to the value of parameter "n":

- n = 0: underscore enabled only for one line
- n = 1: normal underscore (continuous)

Command Codes

PAGE FORMAT

A Left margin

B Right margin

C Length of print area

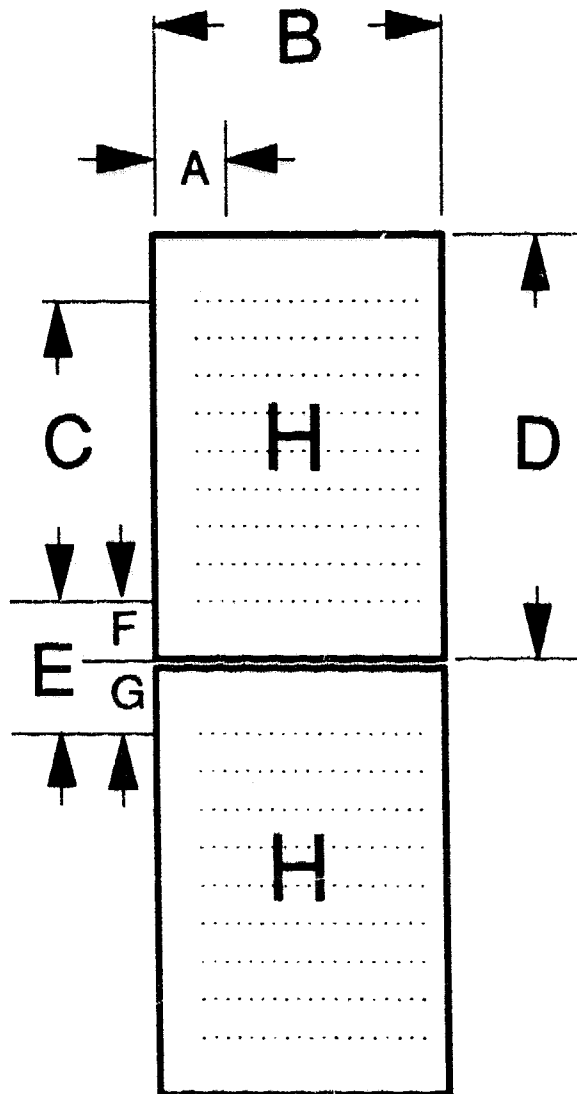
D Page length

E Perforation skip ($E = F + G$)

F BOF (Bottom of Form)

G TOF (Top of Form)

H Print area



Command Codes

ESC & I n A

Paper Format

(27 38 108 n 65)D
(1B 26 6C n 41)H

Selects the format of paper to used, according to the value of parameter *n* in the following table:

<i>n</i>	Format	Name
0	DEFAULT	
2	8 1/2" x 11"	U. S. Letter
3	8 1/2" x 14"	U. S. Legal
26	210 x 297 mm	A4
29	148.5 x 210 mm	A5
81	9 1/2" x 4 1/8"	Envelope COM.10

The default format is that defined in printer SET-UP.

ESC & I n P

Page Length

(27 38 108 n 80)D
(1B 26 6C n 50)H

Defines the page length in "*n*" print lines.
This attribute can also be defined in inches in Initial SET-UP.

 Remember to define the **LINE FEED** value **BEFORE** the **PAGE LENGTH** in **PRINT LINES**.

Command Codes

 The following commands are listed and described in the order of priority in which they must be sent to the printer (e.g.: the line feed value must be defined before the page length in number of lines; the TOF must be defined before the length of the printer area in number of lines, etc.).

ESC & 1 n D	Line Feed (in LPI)
-------------	--------------------

(27 38 108 n 68)D
(1B 26 6C n 44)H

Defines the line feed value in lines per inch (LPI).

The default value is 6 LPI.

E.g.: to define a line feed value of 8 LPI, send the command code ESC (& 18 D.

ESC & 1 n C	Line Feed (in n/48")
-------------	----------------------

(27 38 108 n 67)D
(1B 26 6C n 43)H

Defines the line feed value in n/48" (number of elementary vertical steps).

$1 \leq n \leq 126$

ESC =	Half Line Feed Forward
-------	------------------------

(27 61)D
(1B 3D)H

Advances the paper half the current line feed value.

ESC & a n L	Left Margin
-------------	-------------

(27 38 97 n 76)D
(1B 26 61 n 4C)H

Defines the left margin position in number of columns (characters, according to the current print pitch) starting from the physical left hand margin (first print position = column 0), which is also the default margin.

Column 0 is positioned 1/8" in from the left edge for all single paper formats loaded automatically.

Command Codes

ESC & a n M

Right Margin

(27 38 97 n 77)D
(1B 26 61 n 4D)H

Defines the right margin position in number of columns (characters, according to the current print pitch) starting from the physical left hand margin (first print position = column 0).

The default value for the right hand margin is column 79 (at 10 cpi).

ESC 9

Clears Left and Right Margins

(27 57)D
(1B 39)H

Clears the left and right hand margins, restoring the default values.

ESC & l n E

Top of Form (TOF)

(27 38 108 n 69)D
(1B 26 6C n 45)H

Defines the TOF in a number of lines ("n"), according to the current line feed value.

With the perforation skip enabled, the default value of TOF is 1/2".

TOF is ignored if the perforation skip is disabled.

When TOF is defined, the default value of the print area length is restored (see next command).

The Bottom of Form (BOF) is defined automatically when the print area length is defined (TOF + Print Area + BOF = Page Length).

Command Codes

ESC & I n F	Print Area Length
(27 38 108 n 70)D (1B 26 6C n 46)H	Defines the print area length in a number of lines ("n"), according to the current line feed value. This parameter is significant ONLY if the perforation skip is enabled. If the value of "n" is greater than the page length minus TOF, the command is ignored. If the value of "n" is 0, the printer area will be the physical page length minus one inch.

 ***The page length and the TOF value MUST be defined BEFORE the print area length.***

VERTICAL POSITIONING OF CURSOR

ESC & a n R	Positioning on Line "n"
-------------	-------------------------

(27 38 97 n 82)D (1B 26 61 n 52)H	Moves the current print position to the line specified by parameter "n".
--------------------------------------	--

 *The forward/reverse movement of the print position is restricted to the current page. The first line = 0 and the number of lines on the page will depend on the form length used and the current line feed value.*

ESC & a + n R	Positioning "n" Lines Forward
---------------	-------------------------------

(27 38 97 43 n 82)D (1B 26 61 2B n 52)H	Moves the current print position forward a number of lines indicated by parameter "n".
--	--

ESC & a - n R	Positioning "n" Lines Back
---------------	----------------------------

(27 38 97 45 n 82)D (1B 26 61 2D n 52)H	Moves the current print position back a number of lines indicated by parameter "n".
--	---

ESC * p n Y	Positioning on Dot "n"
-------------	------------------------

(27 42 112 n 89)D (1B 24 70 n 59)H	Moves the current print position to the dot specified by parameter "n" (one dot = 1/300").
---------------------------------------	--

 *The dot positions are numbered from the top margin (0).*

ESC * p + n Y	Positioning "n" Dots Forward
---------------	------------------------------

(27 42 112 43 n 89)D (1B 24 70 2B n 59)H	Moves the current print position forward a number of dots indicated by parameter "n".
---	---

Command Codes

ESC * p - n Y	Positioning "n" Dots Back
---------------	---------------------------

(27 42 112 45 n 89)D (1B 24 70 2D n 59)H	Moves the current print position back a number of dots indicated by parameter "n".
---	--

ESC & a n V	Positioning on Decipoint "n"
-------------	------------------------------

(27 38 97 n 86)D (1B 26 61 n 56)H	Moves the current print position to the decipoint specified by parameter "n" (one decipoint = 1/720").
--------------------------------------	--

 *The decipoint positions are numbered from the top margin (0).*

ESC & a + n V	Positioning "n" Decipoints Forward
---------------	------------------------------------

(27 38 97 43 n 86)D (1B 26 61 2B n 56)H	Moves the current print position forward a number of decipoints indicated by parameter "n".
--	---

ESC & a - n V	Positioning "n" Decipoints Back
---------------	---------------------------------

(27 38 97 45 n 86)D (1B 26 61 2D n 56)H	Moves the current print position back a number of decipoints indicated by parameter "n".
--	--

HORIZONTAL POSITIONING OF CURSOR

ESC & a n C	Positioning First Print Position in Column "n"
-------------	--

(27 38 97 n 67)D
(1B 26 61 n 43)H

Moves the first print position to the column specified by parameter "n".

The horizontal movement is calculated from the leftmost print position (0) and the number of columns in the print line will depend on the current print pitch.

 *The horizontal positioning of the print position is not limited by the lateral margins.*

ESC & a + n C	Positioning "n" Columns to the Right
---------------	--------------------------------------

(27 38 97 43 n 67)D
(1B 26 61 2B n 43)H

Moves the first print position to the right a number of columns indicated by parameter "n".

ESC & a - n C	Positioning "n" Columns to the Left
---------------	-------------------------------------

(27 38 97 45 n 67)D
(1B 26 61 2D n 43)H

Moves the first print position to the left a number of columns indicated by parameter "n".

ESC * p n X	Positioning First Print Position on Dot "n"
-------------	---

(27 42 112 n 88)D
(1B 24 70 n 58)H

Moves the first print position to the dot specified by parameter "n" (one dot = 1/300").

 *The dot positions are numbered from the leftmost print position (0).*

ESC * p + n X	Positioning "n" Dots to the Right
---------------	-----------------------------------

(27 42 112 43 n 88)D
(1B 24 70 2B n 58)H

Moves the first print position to the right a number of dots indicated by parameter "n".

Command Codes

ESC * p - n X	Positioning "n" Dots to the Left
---------------	----------------------------------

(27 42 112 45 n 88)D (1B 24 70 2D n 58)H	Moves the first print position to the left a number of dots indicated by parameter "n".
---	---

ESC & a n H	Positioning First Print Position on Decipoint "n"
-------------	---

(27 38 97 n 72)D (1B 26 61 n 48)H	Moves the first print position to the decipoint specified by parameter "n" (one decipoint = 1/720").
--------------------------------------	--

 *The decipoint positions are numbered from the leftmost print position (0).*

ESC & a + n H	Positioning "n" Decipoints to the Right
---------------	---

(27 38 97 43 n 72)D (1B 26 61 2B n 48)H	Moves the first print position to the right a number of decipoints indicated by parameter "n".
--	--

ESC & a - n H	Positioning "n" Decipoints to the Left
---------------	--

(27 38 97 45 n 72)D (1B 26 61 2D n 48)H	Moves the first print position to the left a number of decipoints indicated by parameter "n".
--	---

ESC & k n H	n/120" Horizontal Motion Index (HMI)
-------------	--------------------------------------

(27 38 107 n 72)D (1B 26 6B n 48)H	Defines the horizontal space occupied by each character in n/120" (number of elementary horizontal steps).
---------------------------------------	--

$1 \leq n \leq 126$	To change the character width, calculate in n/120" the character width desired.
---------------------	---

 *This command CANNOT be used for proportionally spaced characters, with the exception of the SPACE character.*

GRAPHIC MODE

This printer can also print in "dot-image" graphic mode, in which the data is printed in pixel (Picture Element dot) patterns. In this mode, the paper is treated as a grid on which dot positions may or may not be printed. The bit status in the data bytes sent from the host will indicate which bits are to be printed (= 1) and which are not (= 0). Each data group transmitted corresponds to a raster row of the graphic image. The least significant bit (LSB) corresponds to the rightmost dot; the most significant bit, to the leftmost dot (MSB).

byte 1	byte 2	byte 3	byte 4	0	0	128	0
00000000	00000000	10000000	00000000	00000000	00000000	10000000	00000000
00000000	00000000	11000000	00000000	byte 1	byte 2	byte 3	byte 4
00000000	00000000	11100000	00000000				
00000000	00000000	11110000	00000000				
00000000	00000000	11111000	00000000				
00000000	00000000	11111100	00000000				
00000000	00000000	11111110	00000000				
00000000	00000000	11111111	00000000				
11111111	11111111	11111111	10000000				
11111111	11111111	11111111	11000000				
11111111	11111111	11111111	11100000				
11111111	11111111	11111111	11110000				
11111111	11111111	11111111	11111000				
11111111	11111111	11111111	11111100				
11111111	11111111	11111111	11111110				
11111111	11111111	11111111	11111111				

The graphic data is sent to the printer using the following commands, which must be transmitted in the order indicated:

- End graphic printing
- Select graphic resolution
- Select graphic printing width
- Select printing mode
- Start graphic printing
- Send data with or without margins
- End graphic printing.

The start, transfer and end graphics commands must be sent with each graphic data block transmitted to the printer. The graphics resolution selection command need only be sent if the resolution is to be changed. The printing mode and the margins can be varied for each raster row.

* Throughout this section, when describing graphic images, the following convention will be used: the character "0" indicates a "non-printed" dot (bit at 0); the character "1" indicates a printed dot (bit at 1).

Command Codes

ESC * t n R

Graphic Resolution

(27 42 116 n 82)D
(1B 2A 74 n 52)H

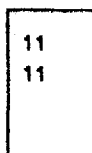
Selects the graphic resolution according to the value of parameter "n".

n = 75, 100, 150, 300 dpi

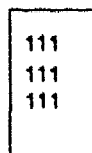
A change in resolution changes the size of the graphic image, as each pixel received is printed with one or more dots, depending on the resolution selected (see below).



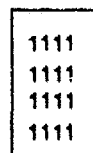
300 dpi



150 dpi



100 dpi



75 dpi

* This attribute can also be selected in printer SET-UP.

ESC * r n S

Graphic Printing Width

(27 42 114 n 83)D
(1B 2A 72 n 53)H

Defines the width of graphic printing according to the value of parameter "n" (in pixels).

When the printer is switched on, initialized (RESET) or receives an "End of Graphic Printing" command (ESC * r B), the graphic printing width is extended to the entire width of the page.

The possibility of restricting the page width to that strictly necessary for the graphic printing permits a more rational use of the printer memory with a consequent increase in throughput.

Command Codes

ESC * b 0 M

Normal Graphic Printing

(27 42 98 48 77)D
(1B 2A 62 30 4D)H

Selects normal graphic printing in which each bit sent to the printer represents a one-to-one map of the dots that will be printed.

E.g.: if the character "U" (binary value - 01010101) is sent to the printer using the command code ESC * b 0 m 1 W U (see ESC * b n W data) and printed with a density of 300 dpi, the following graphic image will be created:

```
0 1 0 1 0 1 0 1
7 6 5 4 3 2 1 0
```

ESC * b 1 M

Compacted Mode 1

(27 42 98 49 77)D
(1B 2A 62 31 4D)H

Allows graphic data transmission in compacted format, thus reducing the amount of data to be sent and increasing the printer productivity.

It is extremely useful when the raster row contains a series of identical data bytes.

E.g.: if the character "U" (binary value - 01010101) is to be repeated five times, instead of sending the standard command: ESC * b 0 m 5 W U U U U U, the compacted command: ESC * b 1 m 2 W [(04)H] U can be used.

The compacted command structure is as follows: "1 m" indicates compacted mode 1; "2" indicates that the data length is two bytes; "W" is the transfer command termination character; "(04)H" indicates that the data which follows is to be printed and repeated four times; "U" is the data to be printed.

 *The data transmitted can be repeated up to 255 times.*

The total amount of identical data printed will be the number of repetitions plus 1.

Command Codes

ESC * b 2 M

Compacted Mode 2

(27 42 98 50 77)D
(1B 2A 62 32 4D)H

Allows graphic data transmission in compacted format, thus reducing the amount of data to be sent and increasing the printer productivity.

It is extremely useful for printing repetitive and dissimilar data blocks in the same raster row.

E.g.: if the letter "U" (binary value - 01010101) is to be repeated four times, followed by the letters "R", "S" and "T", printed once, instead of sending the standard command: ESC * b 0 m 7 W U U U U R S T, the compacted command: ESC * b 2 m 6 W [(FD)H] U [(02)H] R S T can be used.

The compacted command structure is as follows: "2 m" indicates compacted mode 2; "6" indicates that the data length is six bytes; "W" is the transfer command termination character; "(FD)H" indicates that the data which follows is to be printed and repeated three times; "U" is the repetitive data to be printed; "(02)H" indicates that a further three dissimilar data bytes follow; "R", "S" and "T" are the data bytes to be printed.

 *The number of repetitions must be within the field -1 to -127. The negative value differentiates it from the data block length indicator: (FF)H indicates a value of (-1)D.*

The total amount of identical data printed will be the number of repetitions plus 1.

The number indicating the data block length must be within the field 0 to 127 (total data block = block length plus 1). The value 0 (followed by one data byte) must be used to transmit a single data byte.

The compacted mode can be enabled/disabled within a graphic printing operation, depending of the type of data to be transmitted, thus guaranteeing maximum efficiency in graphic data transfer.

ESC * r n Q

Graphic Printing Quality

(27 42 114 n 81)D
(1B 2A 72 n 51)H

Selects the quality (and corresponding speed) for graphic printing, according to the value of parameter "n".

n	Quality and Speed
0	DEFAULT (LQ) at 120 cps
1	DRAFT at 240 cps
2	LETTER QUALITY at 120 cps

 *When creating graphics, use DRAFT definition for trial runs (to save time and ink), and then use LETTER QUALITY to print the final output.*

The print quality must NOT be selected by application software. The operator must be able to select it as he requires in ON-LINE operating status.

ESC * r n A

Start Graphic Printing

(27 42 114 n 65)D
(1B 2A 72 n 41)H

n = 1 indicates that the data which follows is graphic data, and sets the start position at the current print position.

The current print position can be defined using the CURSOR POSITIONING commands (the top left hand corner of the graphic image will be printed where the cursor is positioned).

n = 0 sets the start of graphic printing at the physical left margin.

 *On reception of this command, the left margin and the graphic resolution remain fixed until an "End Graphic Printing" command is received.*

Command Codes

ESC * b n W data

Send Data for Graphic Printing

(27 42 98 n 87)D data
(1B 2A 62 n 57)H data

Sets the printer to receive "n" graphic data bytes and transfers the same to the printer.

This data is interpreted as a pixel raster row. Each row requires the transmission of this command.

 *Graphic printing is independent of all the margins set for alphanumeric text. It is limited only by the printable area, the raster row width and the page length.*

ESC * b n X

Horizontal (X) Offset

(27 42 98 n 88)D
(1B 2A 62 n 58)H

Inserts "n" blank elementary dots (1/300") at the beginning of the raster row, starting from the left graphic margin.

Once the raster row has been printed, the X-Offset returns to zero.

 *The X-Offset pixel value must be a multiple of eight.*

ESC * b n Y

Vertical (Y) Offset

(27 42 98 n 89)D
(1B 2A 62 n 59)H

Same as for X-Offset (see previous command), except that the insertion is vertical from the top graphic margin.

Command Codes

ESC * r B

End Graphic Printing

(27 42 114 66)D
(1B 2A 72 42)H

Ends graphic printing, returning to alphanumeric printing mode.

After this command you can send an alphanumeric text.

 *After this command, the default values for the following are restored:*

- raster width
- left graphic margin
- compacted modes.

The printing quality selected remains unaltered.

Command Codes

Example of Graphic Printing

```

10 REM *** BASIC program to print an arrow in PCL graphics ***
20 REM
30 REM
40 WIDTH "lpt1:" 255 :REM Disable auto CR-LF
50 OPEN "lpt1:" AS #1 :REM Open printer as a file
60 REM
70 PRINT #1,CHR$(27);"*t75R"; REM: Set resolution to 75 dpi
80 REM
90 PRINT #1,CHR$(27);"*rA"; REM: Start raster graphics
100 REM
110 REM Begin loop to read data and print graphics
120 FOR J = 1 TO 32
130 READ A, B, C, D :REM each raster row has four bytes
140 PRINT #1,CHR$(27);"*b4W";CHR$(A);CHR$(B);CHR$(C);CHR$(D);
150 NEXT J
160 REM
170 REM
180 PRINT #1,CHR$(27);"*rB"; REM: end raster graphics
190 END
200 CLOSE
210 REM
220 This is the data for the arrow
230 DATA 0,0,128,0
240 DATA 0,0,192,0
250 DATA 0,0,224,0
260 DATA 0,0,240,0
270 DATA 0,0,248,0
280 DATA 0,0,252,0
290 DATA 0,0,254,0
300 DATA 0,0,255,0
310 DATA 0,0,255,128
320 DATA 255,255,255,192
330 DATA 255,255,255,224
340 DATA 255,255,255,240
350 DATA 255,255,255,248
360 DATA 255,255,255,252
370 DATA 255,255,255,254
380 DATA 255,255,255,255
390 DATA 255,255,255,255
400 DATA 255,255,255,254
410 DATA 255,255,255,252
420 DATA 255,255,255,248
430 DATA 255,255,255,240
440 DATA 255,255,255,224
450 DATA 255,255,255,192
460 DATA 0,0,255,128
470 DATA 0,0,255,0
480 DATA 0,0,254,0
490 DATA 0,0,252,0
500 DATA 0,0,248,0
510 DATA 0,0,240,0
520 DATA 0,0,224,0
530 DATA 0,0,192,0
540 DATA 0,0,128,0

```

byte 1	byte 2	byte 3	byte 4
00000000	00000000	10000000	00000000
00000000	00000000	11000000	00000000
00000000	00000000	11100000	00000000
00000000	00000000	11110000	00000000
00000000	00000000	11111000	00000000
00000000	00000000	11111100	00000000
00000000	00000000	11111110	00000000
00000000	00000000	11111111	00000000
11111111	11111111	11111111	10000000
11111111	11111111	11111111	11000000
11111111	11111111	11111111	11100000
11111111	11111111	11111111	11110000
11111111	11111111	11111111	11111000
11111111	11111111	11111111	11111100
11111111	11111111	11111111	11111110
11111111	11111111	11111111	11111111
11111111	11111111	11111111	11111111
11111111	11111111	11111111	11111110
11111111	11111111	11111111	11111100
11111111	11111111	11111111	11111000
11111111	11111111	11111111	11110000
11111111	11111111	11111111	11100000
11111111	11111111	11111111	11000000
11111111	11111111	11111111	10000000
00000000	00000000	11111111	00000000
00000000	00000000	11111110	00000000
00000000	00000000	11111100	00000000
00000000	00000000	11111000	00000000
00000000	00000000	11110000	00000000
00000000	00000000	11100000	00000000
00000000	00000000	11000000	00000000
00000000	00000000	10000000	00000000

Command Codes

OTHERS

ESC E

Logical Reset

(27 69)D
(1B 45)H

Resets the printer, returning all the settings to their default values and moving the current print position to the next TOF and left margin.

After reset, the print settings will have the values last defined.

 *Reset does not clear the print buffer and any data pending will be printed.*

ESC z

Autodiagnostics

(27 122)H
(1B 7A)D

Causes the execution of internal diagnostics.

If a fault occurs, all the LEDs on the console will flash simultaneously (to clear the fault, try switching the printer off and then on again). If the fault persists, call your dealer or the technical assistance service.

On completion, the print settings will have the values last defined.

 *The printer executes a FORM FEED both before and after autodiagnostics.*

ESC Y

Code Printing

(27 89)D
(1B 59)H

Enables the printing of the command codes instead of the execution of their function.

Only the following two commands remain executive:

- CR : prints command code and executes a CR+LF
- ESC Z : disables command code printing

Command Codes

ESC Z

Disables Code Printing

(27 90)D
(1B 5A)H

ESC & p n X data

Transparent Printing Mode

(27 38 112 n 88)D data
(1B 26 70 n 58)H data

Prints all the data in transparent mode.

$0 \leq n \leq 32,767$

The data bytes, indicated by the value of parameter "n" are all printed, without exception, whether they are alphanumeric characters or command codes.

 **NO command function is executed.**

ESC & s n C

Wrap Around

(27 38 115 n 67)D
(1B 26 73 n 43)H

Enables/disables the printing of the characters which overrun the right margin on the following line.

$n = 0$: enables
 $n = 1$: disables.

With this feature enabled, the text which overruns the margin will be printed on the next line within the defined margins.

If the feature is disabled, the characters exceeding the right margin will be lost (default).

Command Codes

ESC & k n G

Print Line Closure

(27 38 107 n 71)D
(1B 26 6B n 47)H

Selects the type and function of the line closed commands, according to the value of parameter "n":

n	Function
0	CR = CR; LF = LF; FF = FF
1	CR = CR+LF; LF = LF; FF = FF
2	CR = CR; LF = LF+CR; FF = FF+CR
3	CR = CR+LF; LF = LF+CR; FF = FF+CR

ESC & k n F

Command Code SI/SO enabled for One Line

(27 38 107 n 70)D
(1B 26 6B n 46)H

Selects to enable the command code SO / SI functions (Secondary/Primary Font Selection) for a single print line, or to maintain their standard function, according to the value of parameter "n":

n = 0: SO / SI valid for one line

n = 1: SO / SI standard function.

ESC & k n W

Print Direction

(27 38 107 n 87)D
(1B 26 6B n 57)H

Selects the print direction, according to the value of parameter "n":

n	Print Direction
0	left to right
1	bidirectional
2	right to left

Command Codes

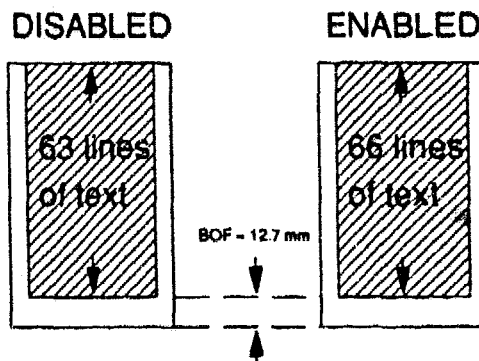
ESC & k n W

Text Scaling

(27 38 107 n 87)D
(1B 26 6B n 57)H

Enables ($n = 6$)/disables ($n = 5$) the text scaling feature.

This feature consists of reducing automatically the current line feed value, so as to recuperate the non-printable area at the foot of the page (BOF = 12.7 mm).



 This feature is possible **ONLY** with **PORTRAIT** orientation and with the **PERFORATION SKIP** setting disabled.

ESC & 10 H

Paper Expulsion

(27 38 108 48 72)D
(1B 26 6C 30 48)H

Causes the paper in the printer to be expelled.

ESC & 11 H

Paper Feed from ASF1 (default)

(27 38 108 49 72)D
(1B 26 6C 31 48)H

Causes the paper in the printer to be expelled and a sheet to be loaded from the paper tray.

 The paper device selection remains valid until a different one is selected.

Command Codes

ESC & 14 H**Paper Feed from ASF2**

(27 38 108 52 72)D
(1B 26 6C 34 48)H

As for ASF1 (see previous command code), except that the paper is loaded from the optional second paper tray.

ESC & 19 H**Paper Feed from ASF2**

(27 38 108 57 72)D
(1B 26 6C 39 48)H

Same function as ESC & 14 H.

ESC & 13 H**Manual Paper Feed (sheet/envelope)**

(27 38 108 51 72)D
(1B 26 6C 33 48)H

Causes the paper in the printer to be expelled and a sheet or envelope to be loaded manually.

CHAP

8

[illegible]

Maintenance and Troubleshooting

This printer is designed to require only minimum maintenance by the user. The only regular operation is the changing of the print cartridge.

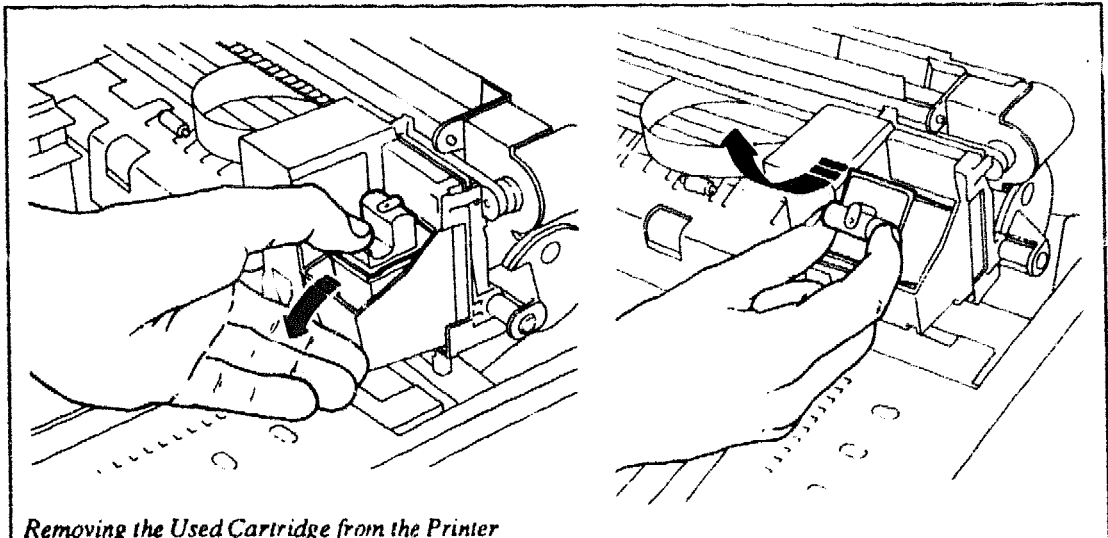
There are also a few service functions which can be executed, should specific technical problems occur on the printer. These operations should be approached with care, preferably with the assistance of a qualified technician.

The second part of this chapter contains a troubleshooting guide, which will help you to recognize some of the problems which may occur when using the printer, together with indications for their solution.

Ⓢ IF YOU DETECT SERIOUS MECHANICAL DAMAGE TO OR A FAILURE IN THE PRINTER, DO NOT ATTEMPT TO REPAIR IT YOURSELF ! CALL DIGITAL SERVICES.

Changing the Print Cartridge

Changing the print cartridge is a fairly straightforward operation; in principle, you did it already when the printer was installed (Chapter 1). This section reviews that operation, allowing you to revise the procedure.



Removing the Used Cartridge from the Printer

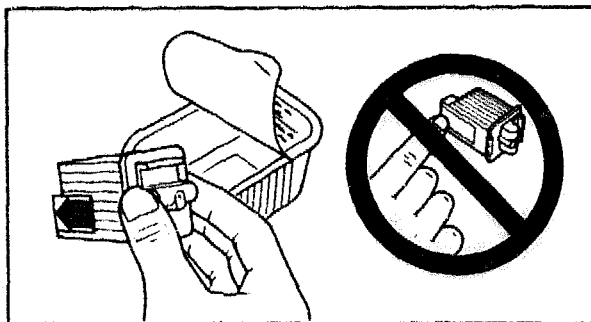
The steps are as follows:

1. Set the printer in LOCAL.

Maintenance and Troubleshooting

2. Open the top cover, to access the print cartridge chamber (see the illustration on the inside of the cover).
3. Remove the used cartridge, pulling it towards the operator console and upwards.
4. Open the sealed container of the new cartridge and remove the protective cover.
5. Lift out the cartridge, holding it in the GREY area (side opposite the protective film).

Do NOT touch the electrical contacts or sit the cartridge on them.

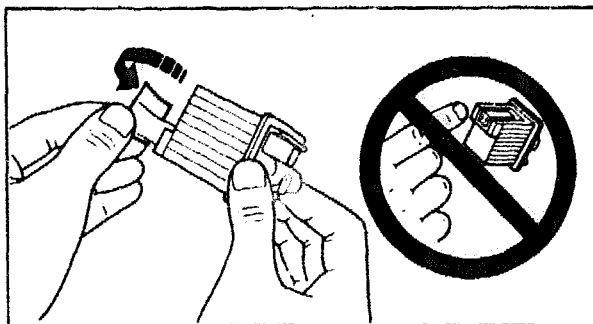


Opening a New Print Cartridge

 ALWAYS use manufacturer-original Bubble Ink Jet Cartridges - code LJ50X-AA.

6. Still holding the cartridge in the grey area, remove the label and the protective film, in the direction indicated by the arrow.

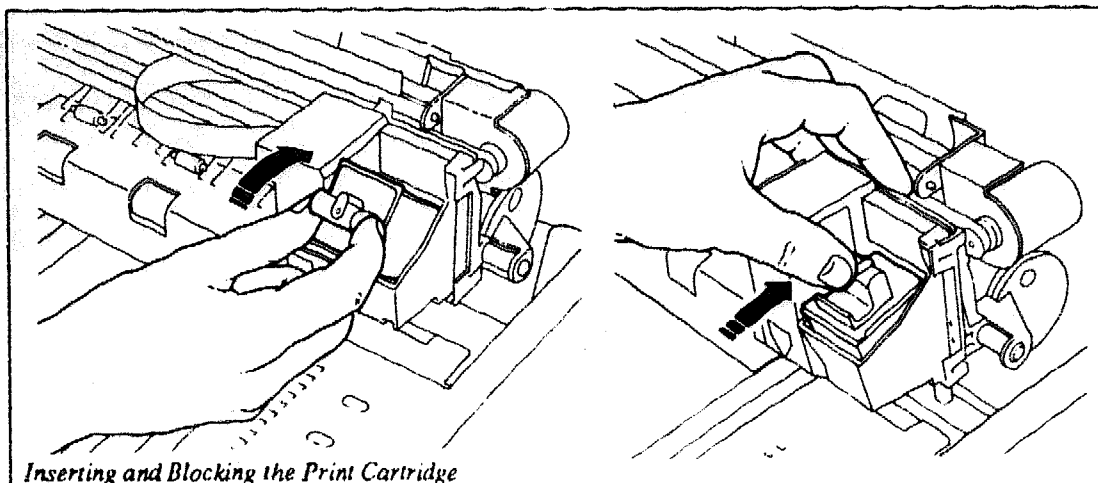
Do NOT touch the printing nozzle or sit the cartridge on it.



Removing the Protective Film

Maintenance and Troubleshooting

7. Insert the print cartridge in its chamber in the printer, pushing it down and then forwards to fix it in place.



8. Close the top cover and resume printing operations.

If dots or lines are not printed completely, remove the print cartridge and repeat the entire insertion operation.

9. If the print quality deteriorates, execute either or both of the following procedures to restore it:

A: Execute the PRIME operation (cartridge reactivation); see the section entitled "ON-LINE Operating Status" in Chapter 3 .

B: Turn over the paper pack in the paper feed tray, so as to print on the other side of the paper.

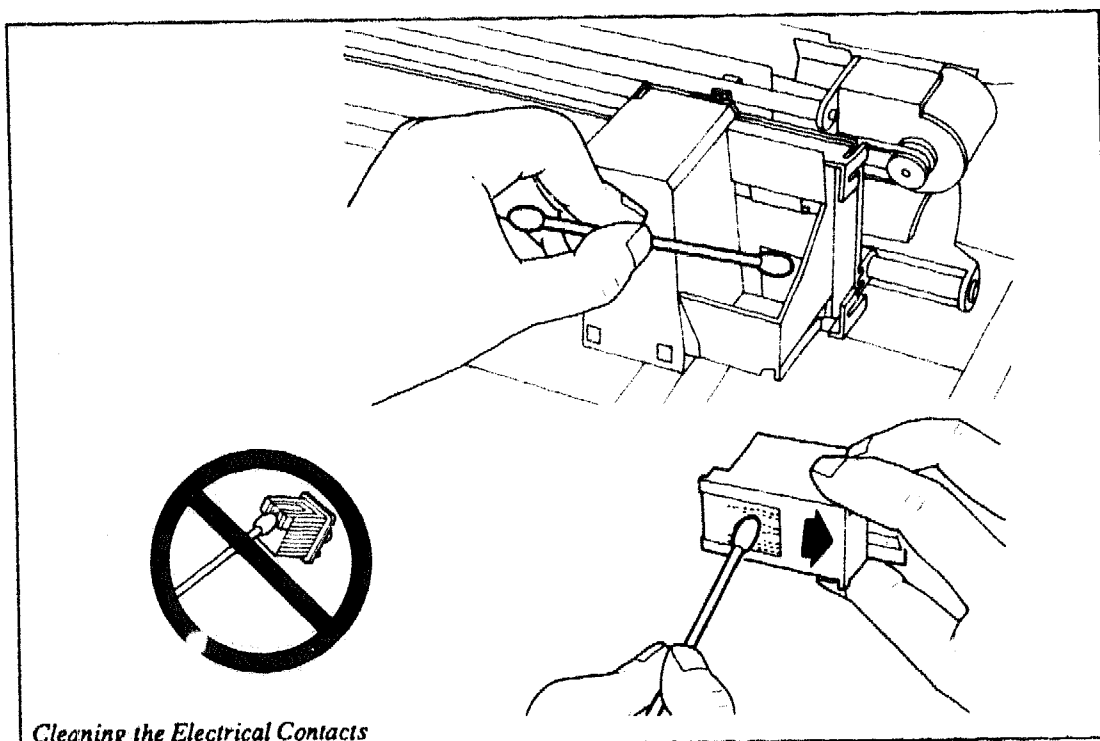
Cartridge Insertion Problems

- Check that the cartridge chamber is free of foreign bodies.
- NEVER force the cartridge into the chamber. If you have problems during its insertion, remove it completely and repeat the entire insertion operation.

Maintenance and Troubleshooting

Partially Printed Characters

- Cartridge not inserted correctly. Remove it and re-insert it correctly.
- Re-activate the cartridge, pressing **PRIME** ; see the section entitled "ON-LINE Operating Status" in Chapter 3.
- Faulty cartridge; replace it with a new one.
- If, during alphanumeric printing, horizontal white lines across the characters or other print quality defects occur, remove the print cartridge and clean the electrical contacts on the cartridge and in the cartridge chamber with a cotton stick.



Maintenance and Troubleshooting

Troubleshooting

If you have problems while working with the printer, check through the following list, to see if you can find the cause of the problem.

 *If a printer malfunction other than those indicated below occurs, or if, after executing the suggested corrective action, the problem persists, call your Digital sales representative or Digital Services.*

Installation

1. Missing or damaged parts.

- Contact your Digital sales representative immediately.

2. Printer does not switch on.

No power supply (all the LEDs are off).

- Check that the mains socket has current.
- Check that the power cable is inserted correctly both in the printer and in the mains socket.
- Check that the printer is switched on.

3. No initial reset.

At switch-on, the print head does not return to the right margin.

- Check that the carriage path is free of impediment.
- If the LOCAL LED is flashing rapidly, there is a failure on the mother board.
- Try switching the printer off and then on again.

4. Print test did not run

- Make sure the top cover is closed properly.
- Switch off the printer, then switch it on again, remembering to hold down **FORM FEED** until the mechanical reset is completed.
- If the carriage does not move, check that its path is not obstructed.
- Check that the print cartridge is inserted correctly.
- Make sure there is paper in the paper tray.

Maintenance and Troubleshooting

5. Problems with connection to host.

- Check that your interface cable is not too long (max. 1.5 m).
- Make sure you have fixed the connector properly at both ends.
- Check that you have configured your application correctly.

Paper

1. No paper

When paper runs out, the printer goes into LOCAL automatically and the LOCAL LED flashes slowly (this condition is also signalled on the parallel interface - PAPER EMPTY signal high - see Chapter 7 and Appendix B).

To clear this condition, reload the paper tray and press **LOCAL**.

2. Paper does not load

- Check that the size and weight of the paper used are within the limits indicated for the paper handling device you are using.
- Make sure the paper is not feeding in crookedly.
- When the ASF is used, check that the ASF option is selected and the LED is lit.

3. Single sheets/envelopes not loaded (or loaded incorrectly)

- The paper/envelope has been inserted incorrectly (not aligned with the paper guide and/or the feed rollers).
- If your application program does not send a paper feed command, set the printer in LOCAL and press **FORM FEED**; then return the printer ON-LINE.
- Remove the paper from the paper tray, leaf them thoroughly, and then reload them, aligning them correctly in the tray.

4. Paper jams or tears

- Paper feed path blocked (e.g. by odd bits of paper).

Open the top cover, remove the jammed paper, then resume printing, pressing

LOCAL (after closing the top cover).

 **Always use paper in perfect condition and within the specifications defined.**

Printing

1. Printer does not print

- Check that the top cover is closed properly.
- Check that the print cartridge carriage can move freely (*with the printer switched off*)
- The printer is not receiving data: wrong interface selected during printer SET-UP.
- Check physical and logical connections between printer and host (at least TWO LEDs must be lit on the operator console).
- Check that you have removed the protective film from the print cartridge.
- Check that the paper loads correctly.
- Check that the printer is in ON-LINE operating status (LED LOCAL off), and that the host system is switched on.
- The printer is not selected: check your program or application software.
- The carriage does not move and all the LEDs flash (this status is also signalled by a low level of the ERROR signal on the parallel interface - see Appendix B): to clear this condition, switch off the printer, remove the cause of the carriage blockage, and then switch the printer on again.

2. Printing stops

- Check that the top cover is closed properly.
- Paper out: the LOCAL LED flashes slowly.

Load more paper and return the printer ON-LINE.

3. Printed characters are faint

- The print cartridge requires replacing or is not inserted correctly.
- Execute the PRIME operation to re-activate the cartridge, or replace it.

4. Printing with missing dots

- Clean the electrical contacts of the print cartridge and its chamber.
- In graphic mode, 7 bit data format has been selected instead of 8 bits.

Change the setting in printer SET-UP environment.

Maintenance and Troubleshooting

5. Poor print quality

- Execute the PRIME operation to re-activate the cartridge, or replace it.
- Turn over the paper pack in the paper feed tray, so as to print on the other side of the paper.

Page Format

1. Printing with wrong vertical spacing.

- Auto LF and/or Auto CR set incorrectly.

If $LF=LF+CR$ and $CR=CR+LF$ have been set simultaneously, a normal MS-DOS file, which ends lines with a CR/LF pair, will print with double linespacing. Change the "AUTO LF ON" setting to "AUTO LF OFF" in printer SET-UP (CR=CR), if the problem is here.

If this setting was left by an application, reset the printer or switch it off and then on again.

- Incorrect linespacing value.

If you choose a linespacing other than 6 lines per inch, the semi-graphic characters in the character table will not join properly vertically.

2. Printing does not reach/overruns the margins

- Incorrect margins settings.

Check that your page format settings are within the physical page area.

The page format can also be set by the application software, or using printer SET-UP.

3. Too much top margin.

- Incorrect form length definition.

Redefine form length correctly.

A - Technical Characteristics

A - Technical Characteristics

Printing Technique	Non-impact, dot matrix (bubble ink jet)
Printing speed (10 cpi)	360 cps in High Speed Draft 240 cps in Draft 120 cps in LQ
Print Line Length	40 characters with 5 cpi pitch 80 characters with 10 cpi pitch 132 characters with 16.6 cpi pitch 160 characters with 20 cpi pitch
Throughput	using 10 cpi pitch, with ECMA 132 text
Pages/hour	- 180 - in HSD - 120 - in LQ
Print Path	Bidirectional. BIM graphic printing is always monodirectional.
Linespacing	Elementary value: 1/300" Fixed values: - 1/6" (4.23 mm) - 1/8" (3.17 mm) - 7/72" - 5 mm
Time required for one line feed	416 ms (1/6" line feed)
Paper feed speed (max.)	63.5 mm/s (2.5 in/s)
Print Characteristics:	
Print Head	50 nozzles (2 rows/columns of 25); capacity: 500,000 characters
Print Orientation	PORTRAIT or LANDSCAPE, selected from console or from line

A - Technical Characteristics

Print Pitch	5, 10, 12, 16.6, 20, 24 cpi; proportional Each basic value can be condensed to half and expanded to double its value (e.g.: 10 cpi: 5 cpi / 20 cpi)
Matrix	300 x 300 dpi
Print Definition (Vertical x Horizontal)	1/300" x 1/100" for High Speed Draft 1/300" x 1/150" for Draft 1/300" x 1/300" for LQ
Graphic Printing	Bit Image Mode
Print Density	Horizontal and vertical: 75, 100, 150, 300 dpi
Character Sets	PC-8 International; PC-8 Denmark/Norway; ROMAN8; ISO 4, 21, 69, 15, 60, 61, 11, 10, 17, 6, 2, 16, 14; ECMA-94 (ISO 8859/1); LEGAL; UNIX Int.; CP 850; CP 860 (Portugal); DK OPE 1; DK OPE 2; Spain 2; CP 863 (French Canada).
Resident Fonts	- Courier Upright/Italic, Portrait/Landscape; - High Speed Draft, Portrait; - Letter Gothic Up/right/Italic, Portrait, Line Draw; - Times Nordic Proportional, Upright/Italic, Portrait.
Paper Handling	Single sheets loaded manually or from paper tray (capacity: 150 80 g/m ² sheets) ASF2 option (see Chapter 5 for paper characteristics)
Interface	Parallel (Centronics)
Line Buffer	8K bytes
Operating Environment	Temperature: 15 to 35 °C Relative Humidity: 15% - 85%
Disturbance	ISO 7779 print test with 10 cpi pitch: 47 dB(A), in HSD; <42 dB (A) in LQ.
Electrical Characteristics	Voltage: 115 - 220 - 240 V; +/- 10% Frequency: 50 - 60 Hz Power absorbed: 35 W

A - Technical Characteristics

Certification

For mains voltage 115 V:

Electromagnetic Compatibility FCC Class B "Certified"

Safety Regulations International: IEC 950
USA: UL 478
Canada: CSA C22.2 No. 220

For mains voltage 220 - 240 V

Electromagnetic Compatibility CISPR Nos. 14 and 22
CEE 87/308
VDE 0875, VDE 0871 level B
FCC Class B "Certified"

Safety Regulations International: IEC 950
Finland: FEI: EN 60950
Norway: NEMKO 502.26; EN 60950
Germany: GS (EN 60950/9.88 e VDE 1000)

Physical Characteristics

Height	5.78 in (147 mm) (without paper tray)
Width	16.73 in (425 mm)
Depth	17.63 in (450 mm)
Weight	19.8 lbs (9 kg)

B - Printer Interface

B - Printer Interface

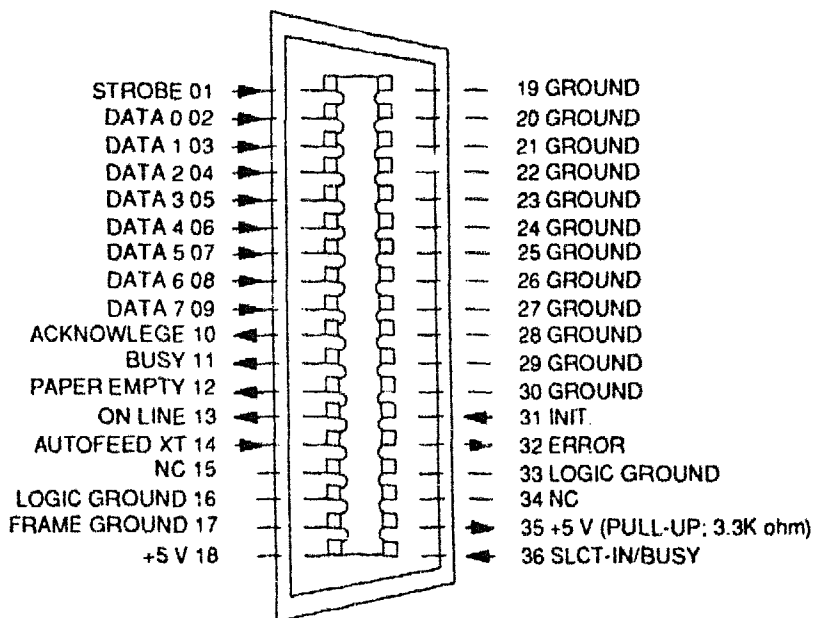
The printer is connected to a PC or host system by means of the resident parallel (Centronics) interface. For correct data transmission/reception, the host system to which your printer is connected must also have the same type of interface.

This appendix contains a brief description of the interface technical characteristics. For the logical connection to your host system and/or application program, see Chapter 6 and read also the instructions given in the host system/application manual.

Parallel Interface Characteristics

The parallel interface cable must be a twisted pair cable, not longer than 1.5 m.

Compatibility:	CENTRONICS
Circuit logics:	TTL
Data format:	7 or 8 bits
Logic voltage levels:	TTL-compatible
Line buffer capacity:	8K bytes
Connector:	Amphenol 36 pins (female)



Connector Pins and Corresponding Signals

B - Printer Interface

The following table contains the signals exchanged by the printer and computer, and their meanings.

PIN	DIRECTION	SIGNAL DESCRIPTION
1	to printer	STROBE Signal, valid at logic level 0, used to transfer data to the printer. Pulse duration must be at least 0.5 μ s.
2-9	to printer	DATA 1 - 8 These 8 lines carry the data transmitted to the printer. Signal duration must be stable at least 0.5 μ s before the falling edge of STROBE signal, and remain stable at least 0.5 μ s after its rising edge.
* Data 8 is the most significant bit but is not used in 7-bit ASCII mode.		
10	from printer	ACK Normally at 1; set at 0 to indicate completion of individual character transfer to printer.
11	from printer	BUSY Normally at 0; logic level 1 indicates that the printer cannot accept any characters, and is activated in the following cases: during data transfer, buffer full, error condition.

B - Printer Interface

12	from printer	PAPER EMPTY Normally at 0; set at 1 if there is no paper. This signal is asynchronous with respect to STROBE, BUSY and ACK.
13	from printer	ON LINE <i>Valid only for optional IBM or EPSON emulation.</i> Set at 1 indicates that the printer is selected (ON-LINE); set at 0 indicates that the printer is in LOCAL. This signal is also handled by command code ESC Q (printer deselection) in IBM/EPSON emulation.
14	to printer	AUTOFEED XT <i>Significant ONLY for emulation EPSON.</i> At logic level 0 indicates that auto LF (CR = CR+LF) is active.
16		LOGIC GROUND Logic ground level (0 V).
17		FRAME GROUND Pin earthed on printer chassis.
18		+5 V (max. 800 mA, with fuse)
19-30		SIGNAL GROUND Twisted pair return lines.

B - Printer Interface

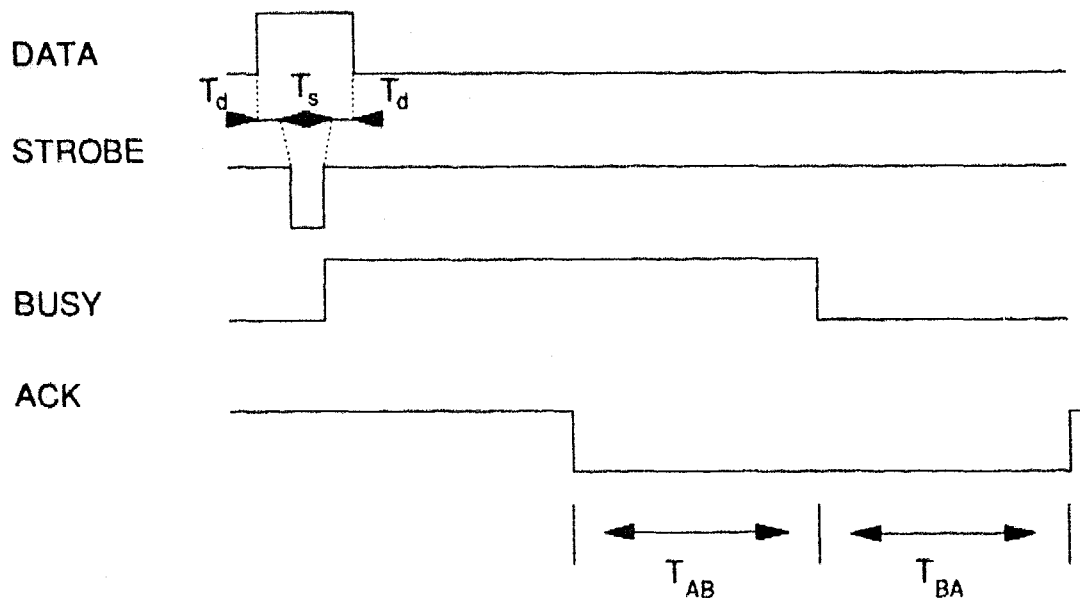
31	to printer	INIT. If at logic level 0 for more than 50 μ s, causes printer logic reset.
32	from printer	ERROR Normally at 1; set at 0 for anomalies such as paper out, printer in local, printer fault condition.
33		LOGIC GROUND Logic ground level (0 V).
35	from printer	+5 V (PULL-UP) Supplied across a 3.3 K Ω resistor.
36	to printer	SLCT-IN / BUSY <i>Significant only for EPSON emulation.</i> Command codes DC1/DC3 are effective only when the signal is low.

B - Printer Interface

Slow Down Mode

To avoid "time-out" problems with MS-DOS operating systems, the printer automatically reduces the reception speed when the line buffer is almost full (800 characters from capacity). At this point the printer accepts only one character per second from the line, thus guaranteeing that there will be no reception interruption for time-out for at least 800 seconds. Once the data has been unloaded by a print operation, the reception speed will return to its normal value.

Signal Timing



$T_d = 0.5 \mu$ s
 $T_s = 0.5 \mu$ s
 $T_{AB} = 8 \mu$ s (min.)
 $T_{BA} = 8 \mu$ s (min.)

C - Accessories and Options

C - Accessories and Options

Accessories

User Guide (English)	EK-LJ36E-UG
Ink Jet Print Cartridge	LJ50X-AA
Parallel Data Cable	BC19M-10

Options

Paper Tray

for A4 format	LJ36X-TA
for LETTER/LEGAL formats	LJ36X-TB

ASF2

Automatic Sheet Feeder Legal Size (150 sheets)	LJ36X-SF
Automatic Sheet Feeder A4 Size (150 sheets)	LJ36X-SG

Emulation Cards

IBM Proprinter 4201/02	LJ36X-CA
EPSON FX 850	LJ36X-CB

Memory Card

RAM Extension Card - 256K bytes	LJ50X-DA
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Character Font Cards

FONT CARD B			LJ50X-CA
Prestige Elite	5 / 10 pts	6 / 12 / 24 cpi	
Prestige Elite Italic	5 / 10 pts	6 / 12 / 24 cpi	
Prestige Elite	3.5 / 7 pts	8.3 / 16.6 / 34 cpi	
Line Draw	6 / 12 pts	6 / 12 / 24 cpi	
Math Prestige	5 / 10 pts	6 / 12 / 24 cpi	
Pi Prestige	5 / 10 pts	6 / 12 / 24 cpi	

C - Accessories and Options

FONT CARD M

LJ50X-CC

Letter Gothic	7 / 14 pts	5 / 10 / 20 cpi
Information	9 / 18 pts	3.2 / 6.5 / 13 cpi
Information	8 / 16 pts	4 / 8.1 / 16.2 cpi
Information	7 / 14 pts	5 / 10 / 20 cpi
Line Draw	6 / 12 pts	5 / 10 / 20 cpi

FONT CARD R

LJ50X-CD

Times Nordic	7 / 14 pts	PS
Times Nordic	6 / 12 pts	PS
Times Nordic	5 / 10 pts	PS
Times Nordic	4 / 8 pts	PS
Times Nordic Italic	6 / 12 pts	PS
Times Nordic Italic	5 / 10 pts	PS

FONT CARD T

LJ50X-CE

Nordic	7 / 14 pts	PS
Nordic	6 / 12 pts	PS
Nordic	5 / 10 pts	PS
Nordic	4 / 8 pts	PS
Nordic Italic	6 / 12 pts	PS
Nordic Italic	5 / 10 pts	PS

FONT CARD U

LJ50X-CF

Times Nordic	15 / 30 pts	PS
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FONT CARD V

LJ50X-CG

Nordic	15 / 30 pts	PS
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FONT CARD L (Landscape Fonts)

LJ50X-CB

Letter Gothic	6 / 12 / 24 pts	12 / 24 cpi
Letter Gothic Italic	6 / 12 / 24 pts	12 / 24 cpi
Letter Gothic	4.7 / 9.5 / 19 pts	16.6 / 33.3 cpi

D - Optional Fonts

D - Optional Fonts

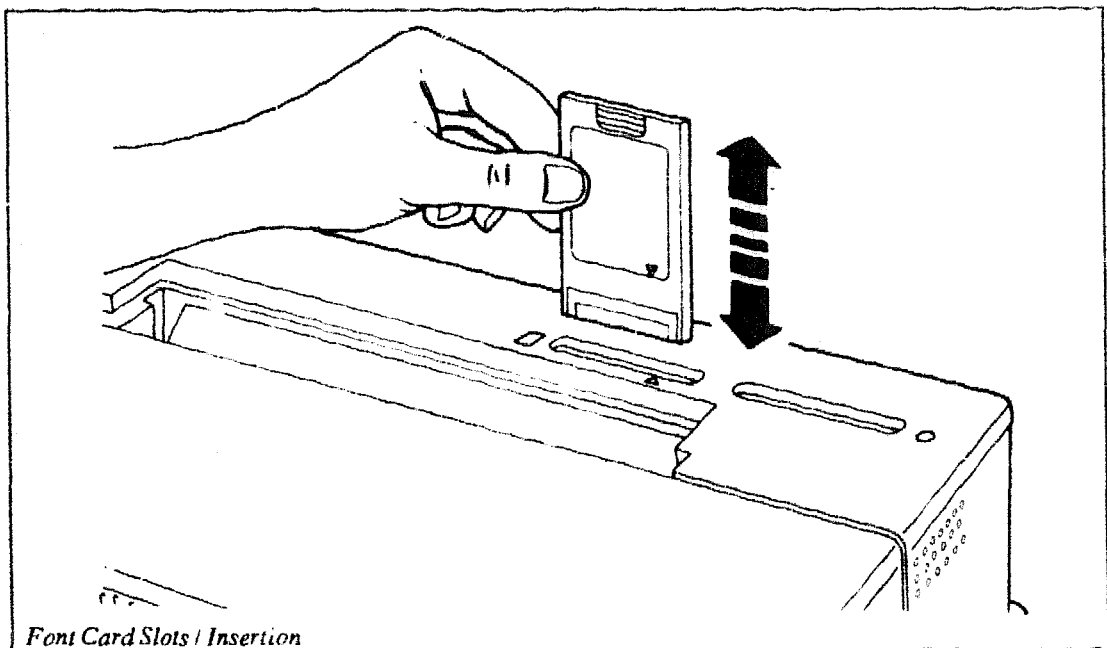
Font Card Insertion

 Always insert the font card with the printer switched off. Insertion with the printer on will cause a hardware reset and the risk of damaging the font card.

Font cards can be inserted in either or both of the slots near the paper tray chamber.

Insert the font card with the symbol ▼ aligned with the corresponding symbol on the printer casing.

Push the font card into the slot until it snaps into the connector on the mother board.



Font Card Slots / Insertion

D - Optional Fonts

Font Selection

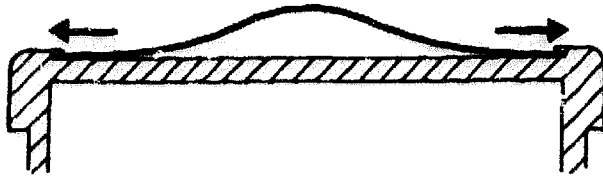
When you use an optional font card, insert its template, supplied with this manual, in the area on the operator console corresponding to the slot used (CARD ● or CARD ■). The template indicates the relationship between the font LEDs on the operator console and the contents of the optional font card inserted (see the following figure).

CARD	LED 1	LED 2	LED 3	LED 4
B	12/24 cpi Prest. Elite	18.8/33.3 cpi Prest. Elite		
L	12/24 cpi Letter Gothic	18/8 cpi Letter Gothic		
M	10/20 cpi Letter Gothic	8.5/13 cpi Information	8.1/16.2 cpi Information	10/20 cpi Information
R	14/7 point Times Nordic	12/6 point Times Nordic	10/5 point Times Nordic	8/4 point Times Nordic
T	14/7 point Nordic	12/6 point Nordic	10/5 point Nordic	8/4 point Nordic
U	30/15 point Times Nordic			
V	30/15 point Nordic			

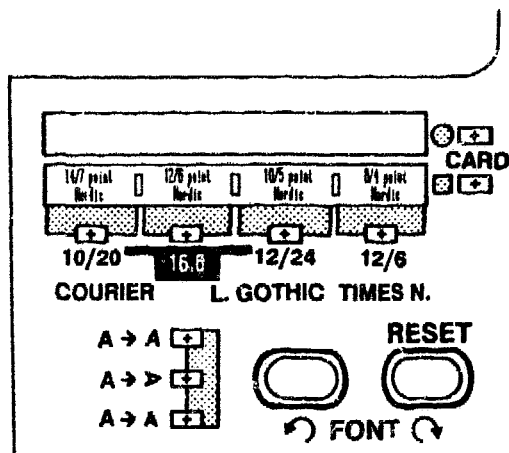
Optional Font Card Templates

Free the template you require, cutting along the prepunched line.

D - Optional Fonts



Make sure you insert the correct template in the area corresponding to the slot in which the font card is inserted.



Font Card T and Template inserted in position CARD ■

D - Optional Fonts

Font Selection Procedure

Insert, for example, Font Card T and its template in the printer (see previous section) in CARD ■ position and set the printer On-Line.

Using **FONT ←** or **FONT →** you can now select from among 12 additional fonts (the resident fonts are always available).

With CARD ■ selected (corresponding LED lit), the font LEDs will indicate one of the following selections:

LED FONT	14/7 NORDIC	12/6 NORDIC	10/5 NORDIC	8/4 NORDIC	A → A	A → A	A → A	CARD O	CARD □
NORDIC PROPORTIONAL 14	■	□	□	□	□	□	□	□	■
NORDIC PROPORTIONAL 12	□	■	□	□	□	□	□	□	■
NORDIC PROPORTIONAL 10	□	□	■	□	□	□	□	□	■
NORDIC PROPORTIONAL 8	□	□	□	■	□	□	□	□	■
NORDIC PROPORTIONAL 7	■	□	□	□	□	□	■	□	■
NORDIC PROPORTIONAL 6	□	■	□	□	□	□	■	□	■
NORDIC PROPORTIONAL 5	□	□	■	□	□	□	■	□	■
NORDIC PROPORTIONAL 4	□	□	□	■	□	□	■	□	■
NORDIC PROP. ITALIC 5	□	□	■	□	■	□	■	□	■
NORDIC PROP. ITALIC 6	□	■	□	□	■	□	■	□	■
NORDIC PROP. ITALIC 10	□	□	■	□	■	□	□	□	■
NORDIC PROP. ITALIC 12	□	■	□	□	■	□	□	□	■

■ = LED lit

□ = LED off

D - Optional Fonts

The following fonts are also contained in Font Card T, but can be selected only from line with the appropriate ESCape sequence:

Nordic 4 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 4 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 52 118 48 115 51 98 52 116 Ⓢ 81

Nordic 5 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 5 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 53 118 48 115 51 98 52 116 Ⓢ 81

Nordic 6 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 6 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 54 118 48 115 51 98 52 116 Ⓢ 81

Nordic 7 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 7 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 55 118 48 115 51 98 52 116 Ⓢ 81

Nordic 8 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 8 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 56 118 48 115 51 98 52 116 Ⓢ 81

Nordic 10 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 10 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 49 48 118 48 115 51 98 52 116 Ⓢ 81

Nordic 12 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 12 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 49 50 118 48 115 51 98 52 116 Ⓢ 81

Nordic 14 pt proportional bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 14 v 0 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 49 52 118 48 115 51 98 52 116 Ⓢ 81

Nordic 5 pt proportional italic bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 5 v 1 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 53 118 49 115 51 98 52 116 Ⓢ 81

Nordic 6 pt proportional italic bold:

ESC (Ⓢ ESC (s Ⓢ u 1 p 6 v 1 s 3 b 4 t Ⓢ Q
27 40 Ⓢ 27 40 115 Ⓢ 117 49 112 54 118 49 115 51 98 52 116 Ⓢ 81

D - Optional Fonts

Nordic 10 pt proportional italic bold:

ESC (① ESC (s ② u 1 p 10 v 1 s 3 b 4 t ③ Q
27 40 ① 27 40 115 ② 117 49 112 49 48 118 49 115 51 98 52 116 ③ 81

Nordic 12 pt proportional italic bold:

ESC (① ESC (s ② u 1 p 12 v 1 s 3 b 4 t ③ Q
27 40 ① 27 40 115 ② 117 49 112 49 50 118 49 115 51 98 52 116 ③ 81

The following tables contain the values for the three variable characteristics. The first two columns of each table contain the ASCII and decimal codes respectively; the third column indicates the variable (symbol set, attribute, print quality).

①		Symbol Set	①		Symbol Set
8U	(56 85)D	ROMAN-8	2S	(50 83)D	ISO 17
11U	(49 49 85)D	PC D/N	1G	(49 71)D	ISO 21
2U	(50 85)D	ISO 2	10U	(49 48 85)D	PC US
1E	(49 69)D	ISO 4	0N	(48 78)D	ECMA-94
0U	(48 85)D	ISO 6	0D	(48 68)D	ISO 60
3S	(51 83)D	ISO 10	1D	(49 68)D	ISO 61
0S	(48 83)D	ISO 11	1F	(49 70)D	ISO 69
0K	(48 75)D	ISO 14	13U	(49 51 85)D	OLI-UNIX
0I	(48 73)D	ISO 15	1U	(49 85)D	HP LEGAL
4S	(52 83)D	ISO 16	12U	(49 50 85)D	CP 850
33I	(51 51 73)D	CP 860 (Portugal)	35P	(51 53 80)D	DENM. OPE 1
34P	(51 52 80)D	DENM. OPE 2	33P	(51 51 80)D	SPAIN 2
34I	(51 52 73)D	CP 863 (Fr. Canada)			

②		Character Attribute
0	(48)D	normal
1	(49)D	superscript
-1	(45 49)D	subscript

③		Print Quality
1	(49D)	DRAFT
2	(50D)	LETTER QUALITY

E - Glossary

ASCII-table	(American Standard Code of Information Interchange); standardized code and character assignment table from 0 to 127 decimal.
ASF	Automatic Sheet Feeder; paper supply device, which allows the handling of packs of single sheets automatically.
backspace (BS)	Control character, which makes the print head move back one character; cannot delete the character like on the screen.
baud	Transmission speed of serial interface; measured in bits per second (bps).
BASIC	Easy-to-handle programming language, which comes together with the MS-DOS operating system (GWbasic).
bidirectional print	A mode of print execution, in which the print head does not return idle to the left margin, but outputs the next print line (or the same line, in the case of double strike mode) in the reverse order while returning to the left margin.
BIM	(Bit Image Mode); printing mode, in which a byte is not interpreted as character. Its bits cause the individual nozzles of the print head to print or not.
bit	smallest information item; a signal set to 0 or 1. Eight bits make one byte (character).
BOF	Bottom Of Form; the area at the foot of each form, in which printing will not be possible (it will be skipped automatically).
buffer	built-in memory in the printer, in which data will be stored before it is printed.
byte	Standard unit for character/symbol representation. A byte consists of 8 bits.
carriage return (CR)	Moves the print head horizontally to the beginning of the line. The print head does not automatically go to next print line (unless programmed to do so).
character generator	A resident printer program, which converts a character code (byte) into a pixel matrix for printing.

E - Glossary

character set	Assignment table between a code and a specific printable character.
condensed printing	A print mode which normally has a character spacing density higher than 12 cpi (15, 16.6, 17.1 or 20 cpi).
continuous stationery	See fan-fold paper.
cpi	Characters per inch; indicates the number of characters which can be printed in one inch.
data format	Refers to the format in which a byte is transmitted to and interpreted by the printer. For parallel transmission only the definition of the number of bits per byte are important, whereas for serial transmission the definition of parity bits and stop bits are also required.
DATASCOPE	Another name for the hexdump print mode (see item).
dB (decibel)	Unit of measurement for noise.
default	The standard initial setting of a feature or a parameter. Can usually be modified.
DLL font	A special character font (Down Line Loaded), which assigns a user- defined matrix layout as the printable character of a given code.
dot matrix	Printing technology which creates characters (and graphics) by the composition of programmed columns of dots..
double width printing	Each character (even SPACE) is stretched horizontally to double the nominal pitch width.
DRAFT	Low dot resolution print mode. Allows fast printing.
driver	Software device which controls output to the printer and does necessary code conversions between software and printer.
elementary spacing	Smallest possible horizontal or vertical movement of the print head.
ELITE	Standard name for a print pitch of 12 cpi.
emulation	Set of commands that can be interpreted by the printer.
ESCAPE character	The special character with the decimal value 27 (ESC), which tells the printer that the following character(s) form a control sequence.
ESCAPE sequence	A set of characters, starting with the ESC character, which controls an action of the printer as defined by its emulation.

E - Glossary

factory default	Printer settings defined by the manufacturer (cannot be overwritten, see user default).
fan fold paper	Continuous stationery with pre-punched tear-off line between the forms and perforated borders. Handled by the printer sprocket.
firmware	The built-in control intelligence of the printer which cannot be changed by the user.
font	A set of characters available in a certain typeface and size (spacing)
font cartridge	An additional plug-in extension of printer memory, which contains one or more fonts (see item).
form feed (FF)	The action executed by the printer, when commanded to go to the first print line of following page. Called by the command FF or automatically when printing arrives at BOF.
handshaking	The signal exchange between the printer and the controlling system, which regulates the loading of data to the printer's buffer and avoids overflow of this buffer.
hexdump	A printing mode in which the transmitted characters (and also control codes) are printed as two digit hexadecimal codes. Used for debugging. Also known as DATASCOPE.
HSD	High Speed Draft; compared to draft mode further reduced character matrix to give an increase in printing speed.
initialisation	The process at printer switch-on in which the printer executes an automatic self-diagnosis of its hardware and loads the settings as defined in programming (set up). Reset by command also causes (re-)initialisation of the printer (but without hardware-check).
ISO table	(International Standard Organization); a convention which assigns to certain ASCII codes (see item) a one-per-nation set of special European characters.
LED	(Light Emitting Diode); the indicators which light up on the printer console.
line buffer	The RAM memory of the printer where incoming data is stored until it is processed. The filling of the line buffer is controlled by the handshaking (see item) procedure of the transmission protocol.

E - Glossary

line feed (LF)	Vertical movement of the print head on reception of the specific command (LF). Does not automatically return the print head to the beginning of the new line (unless programmed to do so).
LOCAL condition	Another word for the printer Off-Line state (see item).
LQ print mode	Letter Quality; printing with a high character definition which approaches solid character profiles.
memory card	A cartridge that contains the circuitry and ROM chips which make up the printer's firmware for a selected emulation/character generator.
off-line	Printer operating condition, in which data and commands via interface are not accepted, but permits execution of operations commanded via the operating console. Indicated by the lighting of the LOCAL LED.
on-line	Printer operating condition, in which it is completely controlled by its host. In this state, the operating console is disactivated except for the LOCAL key, which toggles the printer "off-line" condition.
parallel interface	A means of connecting the printer to a computer with a defined standard plug and pin assignment (usually Centronics). Data is transmitted by 8 "parallel" lines, i.e. one complete byte at a time. Used for short distances (≤ 1.5 m).
parameter	A value or setting for a command or feature.
parity control	A processing for checking the correctness of a transmitted byte by means of a designated "parity bit", which indicates whether the sum of all bits set to 1 in a byte gives an even or odd number. The determining value can be defined as even/odd/none. Widely used with serial data transfer.
parking (paper)	A situation where continuous stationary is drawn back so that it is level with the sprocket to allow single sheet insertion and use.
PICA	Standard name for a print pitch of 10 cpi.
pitch	The character spacing measured in characters per inch.
print buffer	An intermediate buffer in which data coming from the line buffer is stored, until the transmission of a code which commands printing.

proportional printing	A print mode in which the print head movement is proportional to the width of the character printed. Lines of the same length may therefore contain different numbers of characters.
RAM	(Random Access Memory); A memory area which may be written to repeatedly, e.g. the print buffer, font loading area etc.(volatile, i.e. loses contents when overwritten or at printer switch-off).
rear feed	Paper feed procedure, where the paper is fed to the platen from behind the printer.
release X.X	Indicates the version/updating level of the firmware.
reset	Commands the printer to clear the buffer and all temporary settings, returning to an initial switch-on state.
ROM	(Read Only Memory); A memory area which can be read (used) but not modified and contains e.g the built-in character generator, command code emulation etc. (not volatile).
serial interface	A means of connecting the printer to a computer with a defined standard plug and pin assignment, for distances of more than 1.5 m. The data transfer is executed bit by bit according to an established control procedure.
SET-UP	A printer operating mode in which it is possible to program the printer settings interactively and memorize them. Replaces DIP-switch settings.
soft font	A file containing the definition of a set of characters in a certain typeface which can be loaded to the printer memory.
sprocket	A paper feed device which transports continuous stationery.
subscript	A print mode in which the characters are printed in reduced size in lower half of character frame.
superscript	A print mode in which the characters are printed in reduced size in upper half of character frame.
TOF	(Top Of Form); the space on top of a form in which printing is not possible. Will be skipped automatically on the execution of an FF.
user default	Printer settings programmed by the user. Will be loaded at each printer switch-on (redefinable; see factory default).
XON/XOFF	One of the transmission controls with the serial interface (digital break). Data transmission to the printer is stopped and started using the codes DC3/DC1.